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C. K. OGDEN

VESALIUS,

Born at Bruſsels, 1514. Died at Zante, 1564.

"In my opinion he was one of the greatest men that ever lived."

Portal. Hist. de l'anatomie.

"He discovered a new world before he attained the age of twenty eight."

Senac. Tract. du cœur.

THE

ANATOMIST'S
VADE-MECUM.

CONTAINING THE

Anatomy, Phyſiology, Morbid Appearances, &c.

OF THE

Human Body;

The Art of making Preparations, &c.

THE FOURTH EDITION,
REVISED AND ENLARGED.

By ROBERT HOOPER, M.D. F.L.S.

LONDON:
PRINTED FOR MURRAY AND HIGHLEY, FLEET STREET.
1802.

TO

SIR CHRISTOPHER PEGGE, KNT. F.R.S.

REGIUS PROFESSOR OF PHYSIC AND READER IN ANATOMY.

IN THE UNIVERSITY OF OXFORD,

THIS EDITION

IS RESPECTFULLY INSCRIBED,

As a Mark of Gratitude for the many Favours received

by

His ſincere Friend,

THE AUTHOR.

111713

INTRODUCTION.

IT is the intention of the writer, in the following Compendium, to preſent to the ſtudent a uſeful anatomical conſpectus, or pocket manual of anatomy and phyſiology; giving a ſhort but accurate deſcription of the different parts of the human body, and their functions; the method of preparing the various parts of the body, in order to exhibit their ſtructure, in a healthy and diſeaſed ſtate, as far as our preſent knowledge will enable us; and a gloſſary, or explanation of the principal terms uſed in that ſcience.

The utility of ſuch a performance, it is preſumed, will be generally acknowledged, eſpecially when it is conſidered that there is no ſuch work written upon a ſimilar plan.

The principal motive that induced the author to form and collect together, into one ſmall pocket volume, this elementary production, was his having himſelf experienced the want of ſuch an aſſiſtant when applying

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St. Marylebone Infirmary,
January 1802.

A COM-

COMPENDIOUS

HISTORY OF ANATOMY.

FROM the works of HIPPOCRATES, THE FATHER OF MEDICINE, who flouriſhed about *four hundred years before the birth of Chriſt*, is to be collected all the information of antiquity on the ſubject of anatomy. This great phyſician, whoſe principal attention was directed to the ſymptoms and cure of diſeaſes, was, nevertheleſs, well aware of the importance of anatomical knowledge to perfection in the healing art: hence we find, that his works abound with anatomical facts and obſervations, interſperſed with the prevailing doctrines of the day. When it is conſidered, how many obſtacles were thrown in the way of this ſcience, from climate, prejudice, and ſuperſtition, the perſeverance and acquirements of this great man, the ornament of the medical profeſſion, cannot be ſufficiently admired. He deſcribes ſome parts peculiar to the human body which could only be aſcertained by actual diſſection. The body he made to conſiſt of ſolids, fluids, and ſpirits; of containing and contained parts. The elementary humours he divided into four kinds: blood, phlegm, choler or bile, and melancholy or occult bile. This was agreeable to the philoſophy of the age in which he lived; as likewiſe the notions of all bodies being compoſed of earth, air, fire, and water. He never diſtinguiſhed between nerves, arteries, veins, or tendons; but calls the heart and its pericardium a powerful muſcle; he knew the aorta, vena cava, pulmonary arteries and veins, and entertained obſcure notions of the uſes of the valves; but conſidered the auricles as a fan. He mentions the diſtributions of the arteries and veins by trunks and ramifications from the heart; and aſſerts, that all the arteries originate from the heart. The liver was thought to be the root of the veins, the fountain of the blood; and he ſuppoſed it to ſeparate bile. He thought the arteries carried the ſpirits; but was entirely ignorant of the circulation of the blood, and of the uſe of the diaphragm; and his ſeating the ſoul in the left ventricle of the heart is a memorable example of human vanity, and of that inherent inclination in man, boldly to account for what is inexplicable. The heart and lungs, he imagined, received part of our drink. Of the organ of hearing, it is concluded, he knew little, for he only mentions the tympanum. As to the brain, which he thought a gland (an idea which has ſince been erroneouſly ſuppoſed to belong to Malpighi), the nerves and their uſes, viſion and the ſenſes, he was totally ignorant as to the cauſes; yet he makes the brain the ſeat of wiſdom. The glands he imperfectly underſtood. The Pythagorean doctrines of conception, generation, and pregnancy, are, in general, abſurd and ſuperſtitious; as likewiſe his notions of the Pythagorean numbers, which ſeem to have been the prevailing philoſophical follies of the day. On moles, falſe conceptions, and the nouriſhment of the fœtus, a rational judgment is formed; he comprehended the communication from the mother to the fœtus by means of the umbilical cord; though, in another place, he ſuppoſes that it abſorbs nutriment by the mouth, and from the ſurrounding fluid in the ovum.

After Hippocrates, anatomy continued to be improved; but, as opportunities were extremely limited, from the prejudices of mankind, its progreſs was but ſlow, and chiefly confined to the two ſchools of *Athens* and *Alexandria*. In the former, the names of Socrates, Plato, Xenophon, Ariſtotle, and Theophraſtus, are ſtill preſerved along with many of their works; and, although we obſerve that their general attention was directed to philoſophy, yet natural hiſtory and anatomy were far from being overlooked: their opportunities, however, of examining bodies were confined: and after their time, the ſtudy of natural knowledge at Athens ſunk for ever. But while it decayed in Greece and Aſia, it roſe with increaſed energy, under the protection of the Ptolomies, at Alexandria. In this ſchool, which was ſo long pre-eminent, ERISISTRATUS and HEROPHILUS were highly diſtinguiſhed for anatomical knowledge. By the liberal patronage of the Ptolomies, they enjoyed ample opportunities of diſſecting human bodies; and the conſequent improvements which anatomy received were very great. They not only corrected many former errors, but wrote with great judgment upon neurology. They obſerved a variety of ſtructure in nerves ſupplying different parts, and hence diſtinguiſhed them into thoſe which were neceſſary to ſenſe, and thoſe which were ſubſervient to motion.

Between the times of Herophilus and Eriſiſtratus to Galen, a period of five hundred years, ASCLEPIADES, RUFUS EPHESIUS, and the ſenſible and elegant writer CELSUS, flouriſhed. The two latter have given the appellations and ſituations of all the parts of the human body, *in compendio*, in which many diſcoveries appear to have been made from the time of Hippocrates. Neither one nor the other dwelt much on the uſes of the parts. Rufus writes Greek in the conciſe Attic ſtyle, and Celſus is the moſt claſſical writer that ever appeared in the art of medicine.

CLAUDIUS GALENUS, or GALEN, was phyſician to four emperors, and was, without exception, the moſt diſtinguiſhed practitioner of the age in which he lived. He has arranged all the prior anatomical ſcience that Herophilus and Eriſiſtratus had obtained from the actual diſſection of human ſubjects, and incorporated it into his voluminous treatiſes on all the branches of medicine. The medical principles of this great man, formed on the Peripatetic philoſophy of Ariſtotle, are not to the preſent purpoſe; except that they reigned triumphantly in the ſchools and univerſities, diſdaining and cruſhing all innovators or improvers, for a period of nearly fifteen hundred years. The celebrated Galen, however, was a man of uncommon erudition, and he brought into one point of view, with much labour, learning, and induſtry, all the medical and philoſophical ſcience of his predeceſſors. The anatomical part was indubitably extracted from the great Herophilus and Eriſiſtratus, and, conſequently, in general contains what thoſe *firſt diſſectors* of human bodies had obſerved or written. In the works of this eminent phyſician, anatomy appears very conſpicuous and methodical. He gives the ſituation and uſes of all the parts of the human body, whether animal, vital, or natural. What diſcoveries he made, cannot be aſcertained; but Galen was the firſt author who ſeems to have digeſted, in regular order, the human functions, the brain and its membranes, the ſenſes, the contents of the thorax and abdomen, oſteology, a complete myology and neurology, in which are the origin and inſertion of the muſcles, their action, &c.; and the diſtribution of the whole nervous ſyſtem. The lacteal veſſels, likewiſe, were well known; though the extent of their effects, their paſſing through the thoracic duct and ſubclavian vein, to the blood, were not comprehended. The exhalent arteries and inhalents were mentioned, both by Hippocrates and Galen; but the principles of action were unknown. The circulation of the blood, the real uſes of the liver, glands, heart, diaphragm, pancreas, kidney, ureters, bladder, univerſal cellular ſtructure, the power of the nervous ſyſtem over the arteries and veins, the lymphatic abſorbent ſyſtem, were to him unknown.

From the time of Galen to the *fifteenth century*, anatomy was rather on the decline, anatomiſts being conſidered learned or ignorant in proportion to their knowledge of his works. The deſtruction of Alexandria introduced learning among the *Arabians*; but they made but little progreſs in the knowledge of the human body. ABDOLLALIPH, however, towards the cloſe of the twelfth century, expoſed many of Galen's errors in oſteology, by frequenting burial-grounds.

Among the early cultivators of the ſcience of anatomy in the *ſixteenth century*, the GREAT VESALIUS flouriſhed, who may with propriety be ſtyled the RESTORER OF ANATOMY; being the firſt who dared expoſe the errors of Galen, in medicine and anatomy, by referring to the human body. This wonderful man, whoſe perſeverance and genius cannot be ſufficiently admired, was born at Bruſſels, in 1514. After having gone through the uſual ſtudies of the age, he went to Montpellier, to ſtudy medicine. The principal profeſſors in the univerſity of Paris requeſted him to come there, where he attended their lectures. Veſalius's zeal for medicine, particularly anatomy, induced him to brave every danger to which he was expoſed, by clandeſtinely procuring bodies for diſſection. He did not, however, confine his attention to the human ſubject only, but opened a great number of animals. In the purſuit of his favourite ſcience, his veneration for Galen diminiſhed in proportion as he detected his inaccuracies; till at length he threw off all control of this great ſtandard of ancient medicine and anatomy, and became the advocate for actual diſſection of the human body, to which he conſtantly referred in all his diſputations.

The war, which commenced at that time in France, obliging Veſalius to leave Paris, he returned to his own country, Louvain. The knowledge he had acquired in anatomy induced him to profeſs it publicly in that city; but, in order to extend his anatomical reſearches, in 1535, he followed the army of the Emperor Charles the Fifth, againſt France. His reputation increaſed. He was choſen profeſſor of anatomy in the univerſity of Padua, by the republic of Venice, and there gave lectures on medicine, particularly anatomy, for ſeven years.

In 1539, Veſalius publiſhed his anatomical plates, which attracted the admiration of the learned. In this, and in his other works, all the errors of Galen are expoſed. A multitude of enemies ſprung up againſt this bold innovator of old eſtabliſhed authority. All Europe reſounded with invectives againſt him: Euſtachius at Rome, Driander at Marpurg, and Sylvius at Paris, became his public enemies, particularly the latter, who employed every ſpecies of calumny to leſſen him in the eſteem of his patrons; inſtead of Veſalius, he called him *Veſanus*, or a madman; and accuſed him of ignorance, arrogance, and impiety. Fallopius was the only one among his opponents who preſerved any moderation. Having been a pupil of Veſalius, he never forgot how much he was indebted to his preceptor; and, although he was far more able than Sylvius to criticiſe, from having powerful objections to bring forward againſt the work, he proceeded in the moſt delicate and reſpectful manner, influenced by the greateſt eſteem and gratitude for the aſſiſtance he had received from his venerable maſter. Veſalius, on the other hand, acted towards his pupil in the moſt gentle and honourable manner. As ſoon as the remarks of Fallopius on his work, had reached Spain, Veſalius prepared to anſwer them, and replied to him as a father would to his ſon. Fallopius, who has rendered his name dear to poſterity by his extenſive knowledge in anatomy, poſſeſſed ſentiments very different from Sylvius; he was not aſhamed of acknowledging his obligations to Veſalius, for the greater part of his information on anatomy: he admits that Veſalius has not ſhown ſufficient reſpect to Galen, but confeſſes that his objections are generally correct. Notwithſtanding all oppoſition, the reputation of Veſalius daily increaſed, and he eſtabliſhed anatomy on ſolid and permanent principles, when the Emperor Charles the Fifth, by whom he had been already honoured, nominated him his firſt phyſician, and kept him conſtantly at court. He now gained the confidence of the nobility, and frequently gave unequivocal marks of his profound knowledge in the practice of phyſic. But an unexpected event ſoon reduced this great man to diſtreſs. Upon the death of a Spaniſh gentleman, whom he had attended during life, Veſalius requeſted permiſſion of the relatives of the deceaſed to open the body. The moment he expoſed the cavity of the thorax, he ſaw the heart palpitating. This unfortunate affair came to the ears of the gentleman's relations, who proſecuted Veſalius not only as a murderer, but accuſed him of impiety before the Inquiſition, which ſevere tribunal was about to puniſh him for the crime, when Philip the Second, of Spain, ſuggeſted the means of removing him from the deciſion of his Judges, and cauſed him to make a pilgrimage to the Holy Land;

in conſequence of which Veſalius reſolved to make the tour of Paleſtine. He paſſed over to Cyprus with James Malateſte, a Venetian general, and thence to Jeruſalem. Soon after the death of the celebrated Fallopius, which happened in the year 1564, the ſenate of Venice recalled Veſalius to fill the chair; but on his voyage to Padua, he was ſhipwrecked on the iſland of Zante, where this great man, reduced to the utmoſt extremity, periſhed with hunger, on the 15th of October 1564, at the age of fifty years. It is ſaid, that a goldſmith, who landed on that part of the iſland ſoon after the accident, cauſed him to be interred, and that the following epitaph is engraven on his tomb in the church of the Virgin Mary, in that iſland:

Tumulus
ANDREÆ VESALII BRUXELLIENSIS,
Qui obiit idibus Octobris,
Anno M.D.LXIV.
Ætatis vero ſuæ L.
Cum Hieroſolymis rediiſſet.

Veſalius had ſcarcely attained his twenty-fifth year when he publiſhed his work, *De Structura Corporis Humani* —on the Structure of the Human Body. This extraordinary production would appear incredible in ſo young a man, were it not atteſted by the beſt authority. "Veſalius, in my opinion," ſays Monſ. Portal, "is one "of the greateſt men that ever exiſted. Let aſtronomers boaſt of Copernicus; natural philoſophers, of

“ Galileo, Torricelli, &c.; mathematicians, of Paſchal; “ and the geographers, of Chriſtopher Columbus; I “ ſhall always rank Veſalius above them all.” The houſe of Veſalius was lately the convent of Capuchins, at Bruſſels. Theſe pious men conſidered it an honour to date their letters *Ex Ædibus Veſalianis*. It appears, that in the year 1546, Veſalius was at Baſle, to correct the preſs for a new edition of his works. He occupied his leiſure hours, whilſt he reſided there, in preparing a human ſkeleton, which he preſented to the body of phyſicians in that city. It was received with the greateſt pleaſure; and, as a proof of their gratitude, the following inſcription was put under it, which remains to this day:

Andreas Veſal. Bruxell.
Caroli V. Aug. Archiatrus
Laudatiſs. Anatomicorum
Adminiſtr. Comm.
In hac Urbe Regia
Publicaturus
Virile quod cernis Sceleton,
Artis et Induſtriæ ſuæ
Specimen,
Anno Chriſtiano
M.D.XLVI.
Exhibuit erexitque.

From the time of Veſalius, the value of human diſſection was fully appreciated, though oppoſed by the prejudices of the vulgar. The beginning of the *ſeven-*

teenth century is remarkable for the diſcovery of the CIRCULATION OF THE BLOOD, BY THE IMMORTAL HARVEY, in which he was much aſſiſted by the previous diſcoveries of FABRICIUS on the valves in the veins, and by SERVETUS, COLUMBUS, and CÆSALPINUS, who nearly fifty years before demonſtrated the circulation of the blood through the lungs. This has been the moſt important diſcovery ever made in anatomy, and upon it depends the whole of our preſent phyſiology. Soon afterwards, ASELLIUS, an Italian, diſcovered the lacteals, which PECQUET, in 1651, traced to the thoracic duct, and thence to the left ſubclavian vein. In 1653, RUDBECK and BARTHOLIN diſcovered the lymphatics: it does not appear that there was any communication between them; both, therefore, are entitled to equal praiſe. The latter has, however, additional credit from his having entertained very accurate ideas of the phyſiology of the lymphatic ſyſtem, which was afterwards more fully explained by GLISSON.

The two laſt centuries have nearly perfected our knowledge of the human body. Every nation in Europe has produced anatomiſts of the greateſt reputation. The names of ALBINUS, COOPER, DIEMERBROCK, HIGHMORE, CHESELDEN, LEWENHOECK, MALPIGHI, MAYOW, RUYSCH, WILLIS, and WINSLOW, form but a ſmall number of thoſe who have enlightened the ſcience of anatomy in the *ſeventeenth century*. In the *eighteenth*, the following are particularly diſtinguiſhed: HALLER, MORGAGNI, ZINN, WALTER, SCARPA, SOEMMERING, the MONROS, the HUNTERS, CRUICKSHANK, and BAILEY.

Fortunately for mankind, anatomy is now become an indiſpenſable branch of medical ſcience; and throughout Europe we have every where diſtinguiſhed teachers, who are daily adding to the ſtock of uſeful information.

ANATOMY.

ANATOMY.

ANATOMY is a ſcience which explains the ſtructure and uſe of every part of the human body, both ſolids and fluids.

The examination of brute animals, fiſhes, reptiles, polypi, &c. in order to illuſtrate more clearly, or to demonſtrate by analogy, the ſtructure and functions of man, is called *Zootomy*, or *Comparative Anatomy*.

THE PRINCIPLES OF THE HUMAN BODY.

The human body conſiſts of ſolids and fluids. The ſolids are divided into *hard* and *ſoft:* the former comprehending bones and cartilages; the latter, muſcles, nerves, the viſcera, and all the other ſoft parts of the body.

The Solids of the Human Body.

Analyſis of the ſolid parts demonſtrates their conſtituent principles to be *earthy particles* connected together by an *intermediate gluten*.

When theſe principles are joined one to another in a regular ſeries, they form a *ſimple* or *elementary fibre*.

If a number of fibres be joined together, by their breadth they conſtitute a *layer* or *lamina*.

The union of many of theſe *laminæ* without any order forms *cellular ſtructure*, more commonly termed *cellular membrane*.

A membrane is nothing more than a compact or condenſed cellular ſtructure.

Thick, ſtrong, and elaſtic membranes are termed *ligaments*.

When cellular ſtructure is diſtended with a coagulated elaſtic jelly, it forms a *cartilage*.

Phoſphate of lime depoſited in the cellular ſtructure conſtitutes either *bony fibres*, or *laminæ*, which form *bone*.

A nerve is a ſoft bundle of fibres of a pulpy ſubſtance, *ſui generis*, called *nervous* and cellular ſtructure.

The *brain* is compoſed of this nervous ſubſtance.

Muſcles conſiſt of fibres formed of a peculiar ſubſtance, nerves, and veſſels. *Tendons* are the beginnings or ends of muſcles, of a ſilver gliſtening colour.

Blood-veſſels and *abſorbents* are hollow canals formed of membranes, nervous and muſcular fibres, and cellular ſtructure.

Glands are compoſed ſimply of veſſels, nerves, and cellular ſtructure; or a peculiar ſubſtance.

A *viſcus*, that is, an organ or organical part, is a term given to any part which performs a determinate office, as the lungs, the liver, inteſtines, the ſkin, glands, &c. &c. The *viſcera* are compoſed of veſſels, nerves, and cellular texture.

The Fluids of the Human Body.

Theſe conſiſt of the chyle, blood, and various humours ſeparated from the blood. See *Hygrology*.

The ſcience of Anatomy comprehends, and is divided into,

Oſteology,	or doctrine of the	Bones.
Syndeſmology,		Ligaments.
Myology,		Muſcles.
Burſalogy,		Burſæ Mucoſæ.
Angiology,		Veſſels.
Neurology,		Nerves.
Adenology,		Glands.
Splanchnology,		Viſcera.
Hygrology,		Fluids.

OSTEO-

OSTEOLOGY;

OR,

DOCTRINE OF THE BONES.

Bones are hard, compact, inflexible, and inſenſible ſubſtances compoſed of animal earth and gluten, which ſupport and form the ſtature of the body, defend its viſcera, and give adheſion to its muſcles.

The *ſubſtance* of bones is of three kinds:—*Compact*, as in the bodies of the long bones; *ſpongy*, as in the extremities of the long bones; and *reticular*, called alſo the *cancelli* of bones, as in the cavities of bones which have marrow.

Colour. Whitiſh.—Figure. Various.

Long and irregular ſhaped bones are divided into a body and extremities; and flat bones into body and margins.

Bones are variouſly named; ſome from their ſituation, as the frontal, parietal, occipital, naſal, malar, &c.; others from their figure, as the ethmoid bone, clavicle, os cuboides, naviculare, tibia, &c.; and ſome from their uſe, as the ſphænoid bone, the maxillary bone, the femur, &c. The *proceſſes* and *cavities* of bones are named after their figure, as the acetabulum of the os innominatum, the odontoid proceſs of the ſecond cervical vertebra, the coracoid proceſs of the ſcapula, &c.; or from their uſe, as the trochanters of the thigh bone; or from their ſituation, as the naſal, palatine, orbitar proceſſes, &c. &c.

There is a kind of eminence peculiar to bones, called an *epiphyſis*, which ſhould be diſtinguiſhed from an *apophyſis*. The latter is nothing more than a proceſs; but an epiphyſis is a part of a bone connected to that bone by an intervening cartilage; thus the condyles of the thigh bone of a child are ſeparable from the femur. Epiphyſes at length become apophyſes in the adult.

When the bones are deprived of their ſoft parts, and hung together, in their natural ſituation, by means of wire, the whole is termed an *artificial ſkeleton*: but when they are kept together by means of their ligaments, it is called a *natural ſkeleton.*

A Table of the Bones.

				No.
Bones of the HEAD.	The bones of the *cranium*, or *ſkull*	Os frontis		1
		Oſſa parietalia		2
		Os occipitis		1
		Oſſa temporalia		2
		Os ethmoides		1
		— ſphænoides		1
	The bones of the *face*	Oſſa maxillaria ſup.		2
		— jugalia		2
		— naſalia		2
		— lachrymalia		2
		— palatina		2
		— ſpongioſa infer.		2
		Os vomer		1
		— maxillare infer.		1
	Dentes, or *teeth*	Inciſores		8
		Cuſpidati		4
		Bicuſpides		8
		Molares		8
		Sapientiæ		4
	Bone of the *tongue*, or	Os hyoides		1
	Bones of the internal *ear*, ſituated within the temporal bone	Malleus		2
		Incus		2
		Stapes		2
		Os orbiculare		2
Bones of the TRUNK.	The *ſpine*	Vertebræ	Cervical	7
			Dorſal	12
			Lumbar	5
		Sacrum		1
		Os coccygis		1
	The *thorax*	Sternum		1
		Ribs		24
	The *pelvis*	Oſſa innominata		2

				No.
Bones of the Upper Extremities.	The *ſhoulder*		Clavicula	2
			Scapula	2
	The *arm*		Os humeri	2
	The *fore-arm*		Ulna	2
			Radius	2
	The *hand*	*Carpus*, or *wriſt*	Os naviculare	2
			— lunare	2
			— cuneiforme	2
			— orbiculare	2
			— trapezium	2
			— trapezoides	2
			— magnum	2
			— unciforme	2
		Metacarpus		10
		Phalanges		28
Bones of the Lower Extremities.	The *thigh*		Os femoris	2
	The *leg*		Patella	2
			Tibia	2
			Fibula	2
	The *foot*	*Tarſus*	Os calcis	2
			aſtragalus	2
			cuboides	2
			naviculare	2
			cuneiformia	6
		Metatarſus		10
		Phalanges		28
				240
Seſamoid bones of the thumb and great toe, occaſionally found				8
			Total	248

The ſkeleton is divided into head, trunk, and extremities.

OF THE HEAD.

There is a great variety in the ſhape of the heads of individuals. That of females is more delicate; the inſertions of the various muſcles of the face are not ſo ſtrongly marked. The heads of the different nations alſo vary; that of the African is flattened on the forehead, and the teeth and chin are extended forward. The ſhape of the head of the Aſiatic and American negro alſo varies from the European.

The head is divided into the cranium, or ſkull, and face.

OF THE ADULT CRANIUM, OR SKULL.

Shape. Various, according to the cuſtoms of different nations, the bones of the child being ſo tender as to be moulded into almoſt any form. Composed of eight bones—viz. one *os frontis*, which forms the forehead; two *oſſa parietalia*, ſituated at the upper part and ſides of the head; two *oſſa temporum*, placed below the parietal bones; one *occipital*, forming the back part of the head; one *ſphænoidal*, placed in the middle of the baſis of the cranium; and one *ethmoid bone*, ſituated behind the root of the noſe.

Upon viewing the ſuperior part of a ſkull externally, ſeveral *zigzag lines* are obſervable:—that which extends from one temple acroſs over the head to the other temple is termed the *coronal ſuture*; it unites the frontal bone to the two parietal:—that which proceeds from behind one ear upwards acroſs to the other is the *occipital* or *lambdoidal ſuture*; it unites the occipital bone to the two parietal:—and the ſuture which extends upon the crown of the head, from the lambdoidal to the coronal, uniting the two parietal bones, is called the *ſagittal*. They are ſometimes termed the *true ſutures*, to diſtinguiſh them from two *ſpurious* or *ſquamous*, which are found, one on each ſide of the cranium, extending from the temple backwards, in the form of an arch, and uniting part of the temporal bone to the parietal. Beſides theſe ſutures two other portions are to be noticed; the one belonging to the lambdoidal, the other to the ſquamous ſuture, being, in fact, continuations of them: they are called *additamentum ſuturæ ſquamoſæ*, and *additamentum ſuturæ lambdoidalis*. There are, ſometimes, one or more triangular-ſhaped bones obſerved in the courſe of ſome of the ſutures; theſe are called *oſſicula triquetra, triangularia*, or *Wormiana.* Beſides theſe ſutures, there are ſeveral *prominences* upon the upper part of the cranium; two in the frontal bone, one immediately over each eye between it and the ſuture; one in the middle of each parietal bone; and one in the middle of the occipital: theſe point out the *centre of oſſification* of thoſe bones.

Upon the internal ſurface of the upper part of the cranium there are a number of *grooves*, in an arboreſcent form; theſe are made by the ſpinous artery of the dura mater. The ſutures are here ſeen in the form of a line, not dove-tailed, and the whole ſurface appears more poliſhed than the external.

The bones forming the upper part of the ſkull, or, as it is ſometimes called, the *calvaria*, are compoſed of an *external* and an *internal table*, which are of a compact ſtructure, and of a ſpongy intervening ſubſtance, called the *meditullium*, or *diploë*.

The internal ſurface of the baſis of the cranium is divided naturally into eight conſiderable *depreſſions*, adapted to the lobes of the brain and cerebellum. The two *anterior* are immediately over the orbits, and are ſeparated from each other by an obvious eminence, above the root of the noſe, called *criſta galli.* Immediately before this eminence is a ſmall hole, called the *foramen cæcum*; and on each ſide of it are a number of perforations, which tranſmit the olfactory nerves into the noſe; they are called the *foramina cribroſa.* Paſſing backwards, there are two round holes, near each other, one going to the bottom of each orbit; theſe are for the paſſage of the optic nerves, and are called *foramina optica:* beyond theſe holes there is a ſmall cavity, which will admit the end of one's little finger, ſurrounded by four proceſſes, two of which are *anterior*, and two *poſterior*; theſe are termed *clinoid proceſſes*, and the cavity in their middle, which contains the pituitary gland, the *ſella turcica.* Under each anterior clinoid proceſs is a conſiderable fiſſure, the *foramen lacerum orbitale ſuperius*, which communicates with the orbit, and tranſmits the third, fourth, the firſt branch of the fifth, and the ſixth pair of nerves, and the ophthalmic artery. Beyond this fiſſure, proceeding backwards, there is a round and then an oval hole; the firſt is the *foramen rotundum*, through which the ſecond branch of the fifth pair of nerves paſſes; the other, the *foramen ovale*, for the paſſage of the third branch of the fifth pair of nerves. Contiguous to the foramen ovale is a ſmall hole, the *foramen ſpinoſum*, through which the ſpinous artery of the dura mater enters. Between the foramen ovale and the poſterior clinoid proceſs, on each ſide of the ſella turcica, there is a conſiderable ragged aperture, the *carotid canal*, which is partly filled up with cartilage in the freſh ſubject, and is for the entrance of the carotid artery and the exit of the great intercoſtal nerve. A projecting portion of bone next preſents itſelf, called the *petrous portion* of the temporal bone; it has upon its poſterior ſurface an oval opening, the *meatus auditorius internus*, through which the nerve for the organ of hearing, and the facial nerve, enter. Immediately below this is an irregular oval opening, formed by the junction of the occipital with the temporal bone; this is the *foramen lacerum in baſi cranii:* through the anterior part of this opening paſſes the eighth pair of nerves, and the poſterior part tranſmits the blood from the lateral ſinus of the dura mater, whoſe courſe is marked by a *deep groove* leading to the foramen lacerum, into the jugular vein. The portion of bone which proceeds backwards from the poſterior clinoid proceſſes, between the petrous portions of the temporal bone, is the *cuneiform* or *baſilary proceſs* of the occipital bone; it is ſomewhat *hollowed* for the reception of the medulla oblongata, which lies upon it.

At the bottom of this proceſs of bone is a conſiderable opening, called the *foramen magnum occipitale*; it tranſmits the ſpinal marrow, the vertebral arteries, and the acceſſory nerves of Willis; and a proceſs of the ſecond vertebra of the neck lies in its anterior part. Between this opening and the foramen lacerum in baſi cranii is the *foramen condyloideum anterius*, which gives paſſage to the ninth or lingual pair of nerves. Beyond the great occipital foramen is a *crucial eminence*, to which proceſſes of the dura mater are attached; the horizontal eminence ſeparates the two *ſuperior occipital cavities* from the two *inferior*.

The ſkull is divided into *calvaria* and *baſis*. The calvaria comprehends all that portion ſituated *anteriorly*, about an inch above the noſe, and half an inch above the orbits; laterally above the ſemicircular ridge of the parietal bones; and poſteriorly about an inch above the occipital tubercle. The calvaria is the part which is ſawed off to examine the brain after death. The operation of *trepanning* may be performed on any part of the calvaria.

The calvaria is more ſubject to venereal caries than any other of the bones; and one kind is peculiar to it, viz. the *honeycomb caries*: it conſiſts in the total deſtruction, here and there, of one or both tables, ſo as to convey, though very imperfectly, the reſemblance of the cells of a honeycomb. It is alſo ſubject to the ſpongy venereal exoſtoſes.

Monſters are occaſionally born without any calvaria; and when this happens, the greater part or the whole of the brain is wanting.

The calvaria is ſometimes remarkably thick. It is not clear, whether this be the effect of diſeaſe or not. It is, however, very probable, that in ſome inſtances it is the conſequence of rheumatic inflammation.

The *diaſtaſis*, or ſeparation, and often the abſorption, of the bones of the calvaria are frequently the conſequences of an accumulation of water within the ſkull.

OF

OF THE FŒTAL CRANIUM.

The bones of the ſkull of a fœtus at birth are far more numerous than thoſe of an adult; for many of the proceſſes of the latter are epiphyſes in the former; thus the occipital bone conſiſts of four portions; the ſphænoidal of three, &c. There are no ſutures in the cranium of the fœtus. The parietal bones and the frontal bones do not coaleſce until the third year, ſo that before that period there is an obvious interſtice, commonly called *mould*, and ſcientifically, the *fontanel*, or *fons pulſatilis*. There is alſo a leſſer ſpace, occaſionally, between the occipital and parietal bones, termed the *poſterior fontanel*. Theſe ſpaces between the bones are filled up by the dura mater and the external integuments, ſo that, during birth, the ſize of the head may be leſſened; for at that time the bones of the head, upon the ſuperior part, are not only preſſed nearer to each other, but they frequently lap one over another, in order to diminiſh the ſize during the paſſage of the head through the pelvis.

OS FRONTIS.

The frontal bone is ſituated in the anterior part of the ſkull, forming the forehead and upper part of the orbits, and is ſhaped ſomewhat like a cockle-ſhell. It ſometimes conſiſts of two portions, in conſequence of the ſagittal ſuture being continued down through its middle to the noſe. This is more frequent in females than males.

PROCESSES. Two *frontal eminences*, which mark the centres of oſſification; two *frontal tuberoſities*, which are ſituated over the frontal ſinuſes; two *ſuperciliary ridges* or *arches*, which give origin to the frontal muſcles, and whoſe extremities are called the angular or orbitar proceſſes; an *external frontal ſpine*, upon which the oſſa naſi reſt; an *internal frontal ſpine*, to which the dura mater adheres; and two *orbitar plates,* which ſeparate the orbits from the cavity of the cranium.

CAVITIES. The *cerebral cavity*, which contains the anterior portions of the hemiſpheres of the brain; a large *notch* between the orbitar plates for the ſituation of the cribriform plate of the ethmoid bone; two *frontal* or *pituitary ſinuſes* within the bone, above the root of the noſe; two *orbital cavities,* in which are two depreſſions for the ſituation of the lachrymal gland; a *notch* in each ſuperciliary ridge for the trochlea of the ſuperior oblique muſcle; a *ſuperciliary foramen,* through which paſſes the frontal artery and nerve; the *foramen cæcum,* ſituated below the beginning of the internal frontal ſpine.

CONNEXION. The frontal bone is connected with the two parietal by means of the coronal ſuture; with the two oſſa naſi, the two ſuperior maxillary bones, and the two lachrymal bones, by means of what is called the *tranſverſe ſuture*; with the ſphænoid bone by means of harmony, called *harmonia ſphænoidalis*; with the ethmoid bone by *harmonia ethmoidalis*; and with the os jugale by means of ſuture.

The USE of the frontal bone is to conſtitute the forehead, pituitary ſinuſes, part of the orbit, and to contain and defend the anterior lobes of the brain.

The frontal bone at birth conſiſts always of two portions. The ſuperciliary arches and orbitar plates are diſtinctly formed, and ſometimes the frontal ſinuſes.

When performing the operation of trepanning, the ſituation of the frontal ſinuſes, and the longitudinal ſinus of the dura mater, ſhould be remembered.

OSSA PARIETALIA.

Oſſa verticis. Oſſa ſincipitis. Oſſa verticalia. Oſſa bregmatis.

The parietal bones are ſituated one on each ſide of the ſuperior part of the cranium, and are conſiderably convex and ſomewhat quadrangular. Each bone is diſtinguiſhed into an *external* and an *internal ſurface*, and four *angles*, viz. the *frontal*, *ſphænoidal*, called alſo the *ſpinous proceſs*, the *occipital* and *maſtoid*.

EMINENCES and CAVITIES. A *ſemicircular* ridge, from which the temporal muſcle originates; and the *foramen parietale*, which is near the ſagittal ſuture, and tranſmits an artery and a vein of the dura mater. Upon its internal ſurface are the *grooves of the ſpinous artery*; and when the two bones are united, there is a deep *cavity* extending along the ſagittal ſuture, for the longitudinal ſinus of the dura mater.

Each parietal bone is CONNECTED with its fellow by means of the ſagittal ſuture; with the frontal bone by the coronal ſuture; with the occipital by the lambdoidal ſuture; and with the temporal by the ſquamous ſuture.

The USE of theſe bones is, to form the ſuperior part of the cranium.

The parietal bone, at birth, conſiſts of one portion, and partakes of the ſhape of the adult bone. It ſhows, very beautifully, the radiated bony fibres, and the centre of oſſification.

A conſiderable foſſa is ſometimes found in the internal ſurface of theſe bones, near the longitudinal ſinus; it is in conſequence of the preſſure of a protruding portion of the ſinus, or of the Pacchionian glands, by which abſorption of the bone takes place.

OS OCCIPITIS.

Os baſilare. Os memoriæ. Os nervoſum.

The occipital bone is ſituated in the poſterior part of the head, is very convex, and ſomewhat of a quadrate oblong ſhape.

PROCESSES. *Upon the external ſurface.* The *occipital tubercle*, in the middle of the bone to which the ligamentum nuchæ adheres; a *tranſverſe ſpine*, proceeding from each ſide of the tubercle, to which the trapezius and complexus muſcles are attached; a *leſſer tranſverſe ſpine*, below the former, for the inſertion of the recti muſcles; a *prominent ridge* running downwards from the occipital tubercle, and forming, with the above-mentioned ridges, a *crucial ſpine*; the *cuneiform* or *baſilary proceſs*, ſituated before the great foramen; two *condyloid proceſſes* or *condyles*, which are united to the firſt vertebra of the neck.—*Upon the internal ſurface.* An *internal crucial ſpine:* the ſuperior branch gives adheſion to the longitudinal ſinus of the dura mater, the two lateral to the lateral ſinuſes, and the inferior to the ſeptum cerebelli.

CAVITIES. The *foramen magnum occipitale*, through which the ſpinal marrow proceeds into the ſpine, and the vertebral arteries and acceſſory ſpinal nerves into the cranium; two *anterior condyloid foramina*, for the paſſage of the lingual pair of nerves; two *poſterior condyloid foramina* (which are ſometimes wanting), for the paſſage of the occipital vein into the lateral ſinus; two *notches*, which, with two correſponding notches of the temporal bones, form the *foramina lacera in baſi cranii*, for the paſſage of the blood from the lateral ſinuſes into the jugular vein, and the exit of the par vagum; a conſiderable *groove* leading to the above notches, in which the lateral ſinuſes are ſituated. The internal ſurface has alſo four conſiderable *depreſſions* formed by the *crucial ſpine*; the two ſuperior contain the poſterior lobes of the brain, and the two inferior, the two lobes of the cerebellum.

CONNEXION. The occipital bone is connected by the cuneiform proceſs to the ſphænoid bone, in the adult by ſynoſtoſis; hence Profeſſor Sœmmering deſcribes them as one bone, *os occipito-ſphænoidale*; but in youth by ſynchondroſis; with the two parietal and two temporal bones by the lambdoidal future;

with the firſt vertebræ of the neck by ginglymus, and with the ſecond by ſyndeſmoſis.

The USE of the occipital bone is to conſtitute the poſterior and inferior part of the cranium; to contain the poſterior lobes of the brain, the cerebellum and medulla oblongata, and to ſerve for the articulation of the head with the ſpine.

> The occipital bone, at birth, is formed of four portions joined together by cartilages:—one large portion which forms the hinder part of the head; no trace of tubercle nor crucial ſpine is ſeen:—the cuneiform proceſs;—and two portions between theſe forming the ſides of the foramen magnum and the attachment with the atlas.

OS SPHÆNOIDEUM.

Os ſphænoidale. Os multiforme. Os cuneiforme. Os pterygoideum. Os veſpertiliforme.

The ſphænoïdal bone is ſituated in the middle of the baſis of the cranium, extending underneath, from one temple acroſs to the other. Its figure is very irregular; and is compared, by ſome, to a bat with its wings extended.

PROCESSES. Two *alæ majores*, whoſe anterior part forms a portion of the orbit; the inner ſurface has lying upon it a portion of the middle lobe of the brain, and the whole external ſurface is covered by the temporal muſcle.—*Upon the external ſurface.* Two *ſpinous proceſſes*, a narrow point projecting behind each foramen ſpinoſum. The *ſphænoidal ſpine*, or *azygous proceſs*, upon which the baſis of the vomer lies; two *pterygoid proceſſes*, each of which is diſtinguiſhed into a root and two extended plates, or wings; one external, which gives origin on its external ſurface to the pterygoideus externus muſcle, and on its internal ſurface to the pterygoideus internus muſcle; and the other internal; two *hamular* or *hook-like proceſſes*, one on the end of the internal wing of each pterygoid proceſs, over which the tendon of the circumflexus or tenſor palati muſcle turns —*Upon the internal ſurface.* Two *alæ minores*, which form the upper part of the ſuperior orbital fiſſures; four *clinoid proceſſes*, two *anterior* and two *poſterior*.

CAVITIES. The *ſphænoidal pituitary ſinus*, which is in the middle of the bone, has a communication with the noſtrils, and is divided by an intermediate ſeptum; two *pterygoid depreſſions*, one between each greater and leſſer wing, for the reception of a part of the palate bone; two *foramina*, each leading to a canal, called the *pterygoid* or *Viduan canal*, in the root of the pterygoid proceſs, through which the recurrent or Viduan branch of the fifth pair of nerves paſſes into the cranium. —*Internally*. The *ſella turcica*, or *ephippium*, which is ſurrounded by the four clinoid proceſſes, and contains the pituitary gland; two *foramina optica*, one before each anterior clinoid proceſs, which tranſmit the optic nerves; two *grooves*, one on each ſide of the ſella turcica, between the anterior and poſterior clinoid proceſſes, formed by the pulſation of the carotid arteries; two *foramina lacera orbitalia ſuperiora*, between each greater and leſſer wing, through which the third, fourth, firſt branch of the fifth, and the ſixth pair of nerves, and the ophthalmic artery paſs out of the cranium; two *foramina rotunda*, for the paſſage of the ſecond branch of the fifth pair of nerves; two *foramina ovalia*, for the third branch of the fifth pair; two *foramina ſpinoſa*, through which the ſpinous artery of the dura mater enters the cranium. The ſphænoid bone is CONNECTED with all the bones of the cranium; with the frontal, the ethmoid, the two parietal, and the two temporal by harmony, and with the occipital by ſynoſtoſis: it is alſo united to the two cheek bones, the two ſuperior maxillary bones, and the two palate bones by harmony, and to the vomer by gomphoſis. Its USE is to form the baſis of the cranium, to concur in forming the orbits, the pituitary ſinuſes of the noſe, the temples, &c. and to contain the middle lobes of the brain.

> The ſphænoid bone, at birth, conſiſts of five portions (one in the middle ſurrounding the pituitary gland, the two *alæ majores*, and the two pterygoid proceſſes), joined together by ſtrong cartilages. There is no ſphænoidal ſinus formed. The clinoid proceſſes and *alæ minores* are cartilaginous.

OSSA TEMPORALIA.

Oſſa temporum.

The temporal bones are of an irregular figure, and are ſituated at the ſides and inferior part of the cranium, containing within them the organ of hearing. Each bone is divided into a *ſquamous portion*, which is flat, and forms the ſquamous ſuture; and a *petrous portion*, which is very irregular, and is ſituated in the baſis of the ſkull.

PROCESSES. The *zygomatic proceſs*, which, with a proceſs of the os jugale, forms the *zygoma*, yoke, or arch of the temples, underneath which the temporal muſcle moves, and from whoſe lower edge ſeveral muſcles of the face ariſe, particularly the maſſeter and zygomatic. The *maſtoid* or *mammary proceſs*, which projects from under the ear, and has inſerted into its anterior part the ſterno-cleido-maſtoideus muſcle, and into its poſterior part the complexus, the obliquus, and trachelo-maſtoideus. The *ſtyloid proceſs*, which is long and pointed, and gives origin to a ligament of the os hyoides, alſo to the ſtylo-hyoideus, ſtylo-pharyngeus, and ſtylo-gloſſus muscles. The *vaginal proceſs*, which ſurrounds the root of the ſtyloid. The *auditory proceſs*, or outer bony circle of the auditory paſſage, to which the membrana tympani and cartilage of the ear are fixed.

Cavities. The *meatus auditorius externus,* which leads to the cavity of the organ of hearing. The *meatus auditorius internus,* which begins on the internal and poſterior ſurface of the petrous portion, and tranſmits the ſeventh pair of nerves; it has immediately within it the internal opening of the aqueduct of Fallopius.

Each temporal bone is connected with the parietal by the ſquamous ſuture; with the occipital by the lambdoidal ſuture; with the ſphænoid and jugal bones by harmony, and with the lower jaw by arthrodia.

Substance. The ſquamous portion conſiſts of two tables and a diploë; the mammary proceſs of cells which communicate with the cavity of the organ of hearing; and the petrous portion is very hard and compact.

Use. To contain the middle lobes of the brain, and the organ of hearing; and to concur in forming the temples and the baſis of the cranium.

The temporal bone, at birth, conſiſts of three portions: the ſquamous, the petrous, and a *ring-like bone,* which ſurrounds the opening of the tympanum. The laſt bone is ſeen completely oſſified at the fourth month after impregnation: it is not a ring, though termed *annulus oſſeus,* for its ends do not meet. After birth this portion is gradually elongated to form the meatus auditorius externus. It is within the petrous portion that the organ of hearing is ſituated, which is perfectly formed at birth. See *Cavity of Hearing.*

The whole of this bone has been deſtroyed by venereal caries. The bony parietes of the tympanum are often carious from common abſceſſes.

An operation is ſometimes performed on the maſtoid proceſs of this bone, to remedy deafneſs: it conſiſts in removing a portion of the bone by an inſtrument of the trephine kind, and forming a communication of the external air through the maſtoid cells with the cavity of the tympanum. A much more ſimple, and perhaps more certain, operation for this purpoſe, is perforating the *membrana tympani*.

OS ETHMOIDEUM.

Os ethmoidale. Os cribriforme. Os cribroſum.

The ethmoid bone is a four-ſide bone ſituated in the anterior part of the baſis of the ſkull, behind the root of the noſe, and between the orbits.

PROCESSES. A *cerebral* or *cribriform plate*, which lies horizontally above the root of the noſe, within the cavity of the cranium: it is every where perforated by a number of ſmall foramina, through which the olfactory nerves paſs into the cavity of the noſtrils. The *criſta galli*, a proceſs ſomewhat like a cock's comb, which proceeds upwards from the middle of the cribriform plate, and has attached to it the falciform proceſs of the dura mater. Two *orbitar plates*, called alſo *oſſa plana*, and *plana papyracea*, which are very ſmooth externally, and form the inner ſide of the orbits. The *ſeptum ethmoidale*, *naſal plate*, *azygous proceſs*, or *perpendicular lamina*, a conſiderable proceſs, deſcending directly under the criſta galli into the cavity of the noſe, and forming with the vomer the ſeptum narium. Two *cavernous ſubſtances*, which are curled, like a piece of parchment, one on each ſide of the ſeptum, called improperly the ſuperior turbinated or ſpongy bones.

CAVITIES. A number of *cribriform foraminula*, ſituated on each ſide of the criſta galli. Two *foramina orbitalia naſi*, one ſituated in the line of union between the frontal bone and orbitar plate of the ethmoid, for the paſſage of the naſal branch of the orbital nerve. A number of *cells*, which compoſe the internal part of the bone, and form the pituitary ſinuſes of the ethmoid bone.

The ethmoid bone is CONNECTED with the os frontis, the two naſal bones, the two ſuperior maxillary, the two palatine, the ſphænoid bone, and the vomer by harmony.

USE. To form an extenſive ſurface for the organ of ſmell, and to conſtitute part of the noſe, orbits, and cranium.

> The ethmoid bone, at birth, is moſtly cartilaginous; part of the ſeptum ethmoidale, however, conſiſts of bony matter, and the ſuperior turbinated bones are occaſionally found oſſified.
>
> *Caries* and a *complete deſtruction* of this bone have ariſen from tumours of the dura mater and naſal polypi.

OF THE FACE.

The bones of the face are fourteen in number, and conſiſt of thoſe of the upper and under jaw. The upper jaw is formed of thirteen bones, viz. two ſuperior maxillary, two naſal, two palatine, two jugal, or malar, two inferior ſpongy, two lachrymal, and the vomer, which are united to the cranium, and with one another, by harmony. The under jaw conſiſts of one bone.

There is an obvious *line*, beginning at the external angle of the orbit, where the frontal bone is united to the cheek bone, which leads to the inferior opening in the orbit, proceeds upwards to the noſe, whoſe root it croſſes, and then traverſes the other orbit to the external angle: this is called the *tranſverſe ſuture*. The other harmonies of the face are named after the bones which they unite, as the *zygomatic*, *naſal*, *palatine harmonies*, &c.

OSSA MAXILLARIA SUPERIORA.

The ſuperior maxillary bones are two hollow bones ſituated in the anterior and middle part of the face, and aſſiſt in forming the noſe, orbit, and palate; ſo that their ſhape is very irregular.

Processes. The naſal proceſs, which forms the ſide of the noſe. The *orbitar proceſs*, or *plate*, which forms part of the orbit. The *malar proceſs*, by which it is united to the cheek bone. The *alveolar proceſs*, in which the teeth are ſituated. The *palate proceſs*, which forms the palate. A *ſpine*, formed by the union of each palate portion, upon which the vomer reſts. The *orbital margin*.

Cavities. The *antrum maxillare*, called alſo *antrum Highmori*, and *ſinus maxillaris pituitarius*, in the body of the bone, between the orbital and palate proceſſes; it has an opening into the noſtrils. The *infra-orbital canal*, which opens under the margin of the orbit, and tranſmits the infra-orbital nerve. The *lachrymal depreſſion*, ſituated in the ſuperior and internal part of the naſal proceſs, for the ſituation of the lachrymal ſac; it leads to the *canalis naſalis*, which conveys the tears into the noſtrils. The *poſterior palatine foramen*, near the laſt tooth on the inſide, for the paſſage of the alveolar nerve. A *notch* on the anterior part of the palatine proceſs, which with the correſponding notch of the other ſuperior maxillary bone, forms the *foramen palatinum anticum*, or *foramen inciſivum*, which tranſmits the anterior palatine nerve and artery.

Connexion. Each ſuperior maxillary bone is connected with its fellow, with the os frontis, one os naſi, one lachrymal bone, the ethmoid, ſphænoid, one os jugale, one palatine bone, and one inferior ſpongy bone, by harmony; and with the vomer and teeth by gomphoſis.

Use. The uſe of theſe bones is to form part of the face, palate, noſe, noſtrils, and orbits, and to afford a convenient ſituation for the organ of maſtication.

The ſuperior maxillary bone, at birth, conſiſts of one portion; ſo that every proceſs and cavity can be ſeen, but not ſo perfect as in the adult. The alveoli are fewer in number.

Theſe bones are ſubject to caries from diſeaſe in the antrum of Highmore; abſceſs and polypus. Nearly the whole bone has come away from the venereal diſeaſe, and alſo from a long-continued ſalivation.

OSSA MALARUM.

Oſſa jugalia. Oſſa zygomatica.

The cheek bones are ſituated at the ſides of the face, and are nearly of a quadrangular ſhape.

Processes. The *upper orbitary proceſs*, which forms part of the orbit and the ſharp edge of the temple. The *inferior orbitary proceſs*, oppoſite to the former, and conſtituting in part the bottom of the orbit and the edge of the cheek. The *internal orbitary proceſs*, which alſo forms a part of the orbit. The *maxillary proceſs*, by which it is joined to the ſuperior maxillary bone. The *zygomatic proceſs*, which is joined to the temporal bone, to form the zygoma.

Connexion. The os jugale is united to the frontal, ſuperior maxillary, ſphænoid, and temporal bone, by future.

The **use** of theſe bones is to aſſiſt in forming the face and orbits.

Every part of the jugal bone is formed at birth, but the ſhape is rather more triangular.

OSSA NASI.

Oſſa naſalia.

The bones of the noſe are of an oblong and quadrangular ſhape, are formed of a very compact ſubſtance, and are placed cloſe to each other in the ſuperior and middle part of the noſe, in ſuch a way as to form a ſtrong arch, called the bridge of the noſe.

In each bone may be noticed an *external* and an *internal ſurface*, and four margins. There is always a ſmall foramen in each bone for the paſſage of blood-veſſels and nerves.

Uſe. To form the bridge and external part of the noſe.

Each bone is connected with its fellow, and the ſuperior maxillary bone by harmony, and with the frontal and ethmoid by the tranſverſe ſuture.

The *oſſa naſi* are perfectly formed at birth.

OSSA LACHRYMALIA.

Oſſa unguis.

The lachrymal are two flat quadrangular bones, reſembling ſomewhat the nail of the finger, ſituated one in each orbit at the internal angle, and ſeparating the orbit from the noſtrils. The ſurface towards the eye is concave, and has a *foſſa*, or groove, in which the lachrymal ſac is ſituated. The internal ſurface is convex, and covers ſome of the ethmoid cells, and part of the noſtril.

Connexion. Each bone is connected with the frontal, ethmoid, ſuperior maxillary, and inferior ſpongy bone, by harmony.

The uſe of theſe bones is to aſſiſt in covering the labyrinth of the noſe, in forming the orbit, and to afford a ſituation to the lachrymal ſac.

They are completely formed at birth.

Theſe bones are ſubject to caries from *fiſtula lachrymalis.*

The lachrymal bone is perforated obliquely downwards in the operation for fiſtula lachrymalis, in order that the tears may be conveyed into the noſtrils.

OSSA SPONGIOSA INFERIORA.

Oſſa turbinata inferiora. Conchæ inferiores.

The inferior ſpongy bones are ſituated in the ſide and lower part of the noſtrils, and are of a ſpiral and convoluted figure.

Use. To augment the ſurface of the organ of ſmelling.

Connexion. Each bone is united with the ſuperior maxillary, the palate, lachrymal, and ethmoid bone, by harmony.

> They are ſubject to caries and total deſtruction, from the venereal diſeaſe, and naſal polypi.

OSSA PALATINA.

Oſſa palati.

The palatine bones are extremely irregular in their ſhape, and are ſituated in the poſterior part of the noſe, from which they aſcend laterally to the orbits. This irregularity of their figure and their ſituation being ſo varied, gives riſe to their diviſion into palatine, pterygoid, naſal, and orbital portions.

Processes. The *palatal plate,* which forms the poſterior part of the roof of the mouth. The *pterygoid proceſs,* which is ſituated behind the laſt grinder. The *naſal proceſs,* which ariſes perpendicularly from the palate, and covers a part of the antrum of Highmore. The *orbitary proceſs,* which is ſituated in the orbit.

Cavities. The *palatine cells,* which communicate with, and form part of the ſphænoid cells.

Use. To form the poſterior part of the palate, and part of the noſe and orbit. Each bone is **connected** with its fellow, with the ſuperior maxillary bone, the ſphænoid, ethmoid, inferior ſpongy bone, and vomer, by harmony.

> The *oſſa palatina* are very perfectly formed at birth, but cannot, without great difficulty, be ſeparated from the ſurrounding membranes.

> The palatine portions of theſe bones are extremely ſubject to caries from the venereal diſeaſe.

VOMER.

The vomer is a bone ſituated perpendicularly between the roof of the mouth and the ſeptum ethmoidale, in the cavity of the noſtrils, which it divides into two parts. It bears ſome reſemblance to the ploughſhare uſed in former times.

Use. To ſuſtain and divide the cavity of the noſtrils.

Connexion. Superiorly it is united with the ſphænoid bone by gomphoſis, and with the ethmoid by harmony; inferiorly with the ſuperior maxillary and palatine bones by harmony; anteriorly it is united to the cartilaginous ſeptum of the noſe.

> The vomer, at birth, conſiſts of two diſtinct *lamellæ*, with an intervening cartilage.
>
> It is not unfrequently deſtroyed by venereal caries.

OS MAXILLARE INFERIUS.

Mandibula.

The lower jaw is ſhaped ſomewhat like a horſeſhoe, and occupies the inferior and anterior part of the face.

Processes. Two *condyloid* or *articulatory proceſſes*, which are received into the articulatory cavities of the temporal bones. Two *coronoid proceſſes*, which are ſharp pointed, and give adheſion to the temporal muſcles. The *alveolar proceſs*, in which the teeth are fixed. The *ſymphyſis* of the jaw, in the middle of the chin. The *inferior margin*, whoſe ends form the angles of the jaw.

Cavities. A *ſemilunar notch*, between each coronoid and condyloid proceſs. Two *poſterior maxillary foramina*, one above each angle, on the inner ſurface of the jaw, which tranſmit the lower maxillary nerve and artery into a *canal* in the middle of the bone, called *canalis mentalis*, which conducts the ſame artery and nerve to the *anterior maxillary foramina*, upon the external ſurface of the bone, one on each ſide of the chin, from whence the artery and nerve again emerge upon the chin.

Use. To retain the roots of the teeth in the alveolar margin; to conſtitute the inferior ſegment of the cavity of the mouth, and to afford a point of adheſion to the muſcles of the face, neck, larynx, and tongue.

The lower jaw is connected with the temporal bones by ginglymus, with the teeth by gomphoſis, and with the os hyoides and other parts by ſyſſarcoſis.

> The lower jaw, at birth, conſiſts of two pieces, which meet at the ſymphyſis.
>
> Beſides the uſual diſeaſes of bones, the author has ſeen one caſe in which the whole of the lower jaw came away at four different times; and another, where one half came away at one time. The former was under a long-continued ſalivation; the latter from an abſceſs deſtroying the nutritious artery. Their loſs was ſupplied by a very firm body of bone.

OF THE CAVITIES FORMED BY THE BONES OF THE FACE.

ORBITS.

The orbits are two conoidal cavities, ſituated under the forehead, and on each ſide of the root of the noſe. The angles of the orbits are called *canthi.*

Cavities. A *depreſſion* for the lachrymal gland; a *notch* of the orbital trochlea; a *depreſſion* for the lachrymal ſac; the *canalis naſalis* for the paſſage of the tears; a *ſuperior* and *inferior*, or *ſphæno-maxillary orbital fiſſure.* The *ſuperciliary foramen*; the *infra-orbital canal*; the *foramen naſale*, and the *optic foramen.*

Seven bones enter into the *formation* of each of theſe cavities, viz. the frontal, maxillary, jugal, lachrymal, ethmoid, palatine, and ſphænoid.

The USE of the orbits is to contain and defend the organ of ſight and its adjacent parts.

CAVITY OF THE NOSTRILS.

The noſtrils are two pyramidal cavities ſituated under the anterior part of the cranium, in the middle of the face, and covered anteriorly by the noſe.

PROMINENCES. The *ſeptum narium*; the *cavernous ſubſtance* of the ethmoid bone, improperly called the ſuperior ſpongy bones; and the *inferior ſpongy bones.*

CAVITIES. Three pair of *pituitary ſinuſes*, namely, the frontal, ſphænoid, and maxillary; the *caverns* of the ethmoid labyrinth, the *anterior foramina* of the noſtrils, the *ductus naſalis*, the *ſphæno-palatine foramina*, and the *anterior palatine foramina.*

The noſtrils are compoſed of fourteen bones, viz. the frontal, two maxillary, two naſal, two lachrymal, two inferior ſpongy, the ſphænoid, vomer, ethmoid, and two palatine bones.

The USE of theſe cavities is to form a ſituation for the organ of ſmelling, and the pituitary ſinuſes of the noſtrils, and to ſerve alſo for ſpeech and reſpiration.

CAVITY OF THE MOUTH.

The cavity of the mouth is ſituated between the upper and under jaw, and is covered laterally and anteriorly in the freſh ſubject by the cheeks and lips: poſteriorly it is continued into the fauces. The two ſuperior maxillary bones and the palatine portions of the palate bones form the ſuperior part of the mouth, and anteriorly it is cloſed by the

TEETH.

The teeth are hard bones, partly covered with a peculiar ſubſtance, called enamel, and fixed one after another in the

upper

upper and under jaw, in ſuch a manner, that in the adult there are ſixteen belonging to each.

Every tooth is divided into a crown, which is covered by the enamel; a neck, or that part embraced by the gum; and a root, alſo called the fang, which is hidden within the ſocket.

There are four kinds of teeth: *inciſores*, *cuſpidati*, *bicuſpides*, and *molares*.

The inciſors are eight in number, four in each jaw; they are ſituated in the front of the mouth, and are flat and ſharp-edged, ſo as to cut the food; the roots or fangs are ſimple; thoſe of the upper jaw are fixed obliquely backwards, ſo that they generally cover a ſmall part of the inciſors of the under jaw.

The tooth on each ſide of the inciſors is called *cuſpidatus*, or canine; they conſequently are four in number. The fang of theſe teeth is ſingle, and goes a conſiderable way in the jaw, eſpecially the two of the upper jaw, which were ſuppoſed to go to the eye, and are therefore called the eye-teeth. The oral part of the cuſpidati is rounded, and their end pointed, as their name implies.

The bicuſpides are eight in number, two being ſituated next to each cuſpidatus; they appear at both extremities as if they were formed by the junction of two inciſors.

The molares are twelve in number, and ſituated three at the extremity of each jaw. The fangs of theſe are varied; thoſe of the under jaw have two, and thoſe of the upper three. Their oral extremities are full of irregularities, ſo that they are able to grind the food between them. The two laſt molares are diſtinguiſhed by the name of dentes ſapientiæ; they are always the laſt that appear, and not unfrequently the firſt which decay: their fangs are all ſqueezed, as it were, into one.

The teeth are fixed in the alveoli of the jaws by gomphoſis; ſo that each tooth fills up its appropriate ſocket, which is ſeparated from the next by an intermediate, thin, ſpongy partition.

In children, ſoon after birth, a double order of teeth is hidden in their ſockets by the gums. The ſuperior protrudes through the gums about the ſeventh month, which is called the cutting of the teeth; firſt the inciſors, then the molares, and, laſt of all, the cuſpidati. Theſe teeth are termed *milk*, *ſhedding*, or *primary*: they gradually fall out about the ſeventh year, and are ſucceeded by the other order, which till now had been concealed in the bottom of the alveoli.

The teeth are very ſubject to caries, which may ariſe from an internal, though it moſtly does from an external cauſe.

There are a variety of operations performed on the teeth; extraction and ſcaling are the chief.

CAVITY OF THE FAUCES.

This cavity is ſituated under the baſis of the cranium, within the ſuperior bodies of the vertebræ and poſterior part of the noſtrils. It is compoſed of ten bones, viz. the occipital, two palatine, the vomer, the bodies of the three firſt vertebræ, the os hyoides, and the two temporal bones.

Use. For the ſituation of the fauces, larynx, pharynx, and os hyoides.

OS HYOIDES.

Os linguale.

The os hyoides is a bone of a ſemilunar ſhape, ſituated in the fauces between the baſis of the tongue and the larynx.

Prominences. Two *cornua majora*, and two *cornua minora*.

Use. To ſerve for the adheſion of the tongue, for deglutition, and for a point of adheſion to many muſcles.

It is **connected** with the ſtyloid proceſs of the temporal bone, the ſcapulæ, lower jaw, and ſternum, by various muſcles; and with the larynx by ligament.

CAVITY OF HEARING.

This cavity is ſituated within the petrous portion of the temporal bones, and conſiſts of the *meatus auditorius externus*, the *cavity of the tympanum*, and the *labyrinth.*

The meatus auditorius externus is ſomewhat funnel-ſhaped; it is, in fact, a foramen terminating in a larger cavity.

The tympanum is an irregular cavity, covered, in the freſh ſubject, by a membrane, and in which there are four bones, called *oſſicula auditus*; one is hammer-ſhaped, and called the *malleus*, and has a round head, a narrow neck, the manubrium or handle; the other, formed of two legs or crura, and a body, is the *incus*; the one which reſembles a ſtirrup in miniature is called *ſtapes*; and the very ſmall round particle of bone, not larger than the third part of a pin's head, generally found adhering to the long crus of the incus, is termed *os orbiculare*. There are alſo many inequalities of this cavity, and the five following foramina:

1. The *opening of the Euſtachian tube*, ſituated anteriorly; 2. *A canal* in which the *tenſor tympani* muſcle is fixed, which extends from the former opening to the feneſtra ovalis; 3. An oval opening, called *feneſtra ovalis*—the ſtapes is attached to this opening; 4. The *feneſtra rotunda*, which is leſs than the former; 5. An *opening* leading to the maſtoid cells.

The labyrinth is compoſed of three parts: the veſtibulum, cochlea, and ſemicircular canals. They are placed behind the cavity of the tympanum.

The *veſtibulum* is an equally rounded cavity ſituated between the cochlea and ſemicircular canals. It has ſeven openings into it: five of the ſemicircular canals, the feneſtra ovalis, and an opening into the cochlea, called *ſcala veſtibuli*. There is alſo to be noticed in the veſtibulum, a ſmall ſpinous proceſs, to which the barbula adheres; and ſeveral depreſſions correſponding with the alveus communis and the ampullæ of the membranaceous ſemicircular canals deſcribed in *Splanchnology*.

The *cochlea* has obtained its name from its figure: it has a bony nucleus in the middle, called *modiolus*, and two ſpiral windings like thoſe of a ſnail's ſhell, the opening into the tympanum called *ſcala tympani*; the other communicating with the veſtibule, termed *ſcala veſtibuli*. Theſe *ſcalæ* communicate with one another at the top of the *modiolus*. The partition between the wings is called the *ſpiral lamina*; it is partly bone and partly membranous.

The *ſemicircular canals* are three in number: one inferior and poſterior, one ſuperior and middlemoſt, and one exterior and foremoſt. They open into the veſtibule, and contain the membranaceous ſemicircular canals.

OF THE TRUNK.

The trunk of the ſkeleton is divided into the ſpine, cheſt, loins, and pelvis.

SPINE.

Columna ſpinalis. Columna vertebralis. Theca vertebralis. Spina dorſi.

The ſpine is a long, bony, and cartilaginous hollow column, extending from the condyles of the occipital bone of the head down to the *os ſacrum*, in the poſterior part of the trunk.

The bones which compoſe this column are termed *vertebræ*.

Each vertebra is divided into ſurfaces, margins, a body, proceſſes, and cavities.

The body is the thickeſt and foremoſt part, anteriorly convex, and poſteriorly concave; its upper and under ſurfaces are ſomewhat hollowed, and covered with cartilage of a particular nature, called *intervertebral ſubſtance.*

The PROCESSES of a vertebra are ſeven: two *ſuperior obliquely aſcending*, one of which is ſituated ſuperiorly on each ſide; two *inferior obliquely deſcending*, of which one is placed inferiorly on each ſide—theſe four proceſſes are alſo called *articular proceſſes*, for they form the union of one proceſs with another; two *tranſverſe proceſſes*, one on each ſide; and the *ſpinous proceſs*, extending poſteriorly outwards, and forming the *ſpine*, ſtrictly ſo called.

Each vertebra has a *great foramen*, which concurs to form the great canal continued through the whole ſpine for the paſſage of the ſpinal marrow.

There are alſo four notches in each vertebra; two on each ſide, one ſuperior, the other inferior. When two vertebræ are put together, the correſponding notches form *foramina*; and it is through theſe foramina that the ſpinal nerves paſs out.

CONNEXION. The firſt bone of the ſpine is connected with the occipital bone by *ginglymus*; the ſecond vertebra is united with the firſt by *trochoides*, and with the occipital bone by *ſyndeſmoſis.* The bodies of the vertebræ are connected with one another by the intervertebral ſubſtance; and poſteriorly by a yellow elaſtic ligament, and by their oblique proceſſes.

The USE of the ſpine is to ſupport the head and trunk, and to contain and defend the ſpinal marrow.

The ſpine is ſubject to caries, diſtortion, and *ſpina bifida*, called alſo *hydrorachitis.* The latter conſiſts of a tumour filled with water, which makes its way between the proceſſes of a vertebra, and divides it into two.

CERVICAL VERTEBRÆ.

Theſe are ſeven in number: the firſt is called *atlas*; it has no body, nor ſpinous proceſſes, but forms an *arch*, which anteriorly ſurrounds the dentiform proceſs of the ſecond vertebra. Inſtead of upper oblique proceſſes, there are two *articular ſinuſes*. The ſecond vertebra is termed *epiſtrophæus*, or *dentatus*. An *odontoid* or *dentiform proceſs* at the upper part of the body is peculiar to it. All the tranſverſe proceſſes of the remaining cervical vertebræ have a peculiar *foramen* for the paſſage of the vertebral arteries.

DORSAL VERTEBRÆ.

Theſe are twelve in number. They are diſtinguiſhed by a *depreſſion* at the ſides of their bodies, and a ſuperficial one in the points of the tranſverſe proceſſes, for the attachment of the great and little heads of the ribs.

LUMBAR VERTEBRÆ.

The lumbar vertebræ are five in number; they are much larger than the dorſal, and the tranſverſe proceſſes have no depreſſions.

The vertebræ, at birth, conſiſt of three parts, connected together by cartilage; one of theſe is the body, and the other two the tranſverſe proceſſes. The anterior part of the firſt vertebra is entirely cartilage. The ſecond vertebra often conſiſts of five and ſix portions. The ſpinous proceſſes are all cartilage.

When aneuriſm of the aorta is very large, the bodies of the vertebræ are occaſionally abſorbed, but the intervertebral ſubſtance remains entire. This is a ſingular fact; that bone ſhould be ſooner abſorbed than cartilage. The ſame phenomenon takes place in caries from other cauſes. The ſpinal marrow is always defended in theſe caſes by a depoſit of coagulable lymph.

OF

OF THE THORAX.

The thorax or cheſt forms the upper part of the trunk. It reſembles an arched bony cavity, narrow above, broad below, flat anteriorly, hollow poſteriorly, and convex laterally. The bones which compoſe the thorax are the twelve dorſal vertebræ already deſcribed, the ſternum, and twenty-four ribs.

COSTÆ.

The ribs are twenty-four ſemicircular bones, ſituated twelve on each ſide of the cheſt, and extending from the dorſal vertebræ round to the ſternum. They are diſtinguiſhed into ſeven *true ribs* on each ſide, or thoſe whoſe extremities are affixed to the ſternum; and five *ſpurious* or *falſe* on each ſide, whoſe extremities do not reach the breaſt bone. Each rib may be divided into a *body*, or middle part, two *extremities*, two *margins*, and two *ſurfaces*.

Eminences. The *great head*, which is connected to the bodies of the dorſal vertebræ; the *neck*; the *leſſer head*, which is joined to the tranſverſe proceſſes of the dorſal vertebræ; and the *angle* of the rib.

Cavities. A longitudinal groove, for the intercoſtal artery.

Substance. The anterior part of each rib is *cartilaginous*, and the other part is formed of a compact bony texture.

Connexion. Anteriorly with the ſternum, and poſteriorly with the bodies and tranſverſe proceſſes of the dorſal vertebræ.

Use. To form the thorax, to ſerve for reſpiration, to defend the vital viſcera, and to give adheſion to muſcles.

> The ribs, at birth, differ very little in ſubſtance and form from thoſe of adults.
>
> Great portions of the ribs are occaſionally abſorbed from the preſſure of aneuriſms.

STERNUM.

The breaſt bone is ſhaped ſomewhat like a dagger, and is ſituated in the anterior part of the thorax, between the true ribs. It is of a very ſpongy texture, and moſtly conſiſts of two, and ſometimes of three portions. A ſharply pointed cartilage is attached to the inferior extremity of the ſternum, which is named, from its ſuppoſed reſemblance, the *xyphoid* or *enſiform cartilage.* It is ſituated at the pit of the ſtomach.

CAVITIES. The *jugular ſinus,* at the ſuperior and inner part. Two *clavicular ſinuſes,* for the attachment of the clavicles. Seven *coſtal depreſſions,* to which the ribs adhere.

CONNEXION. The ſternum is connected by arthrodia with the clavicle, and with the ſeven true ribs by ſynchondroſis.

USE. To form the thorax, and give adheſion to the mediaſtinum.

The ſternum, at birth, conſiſts of cartilage ſhaped like the adult ſternum, with two, three, or four round oſſifications in its centre.

When caries attacks the ſternum, the diſeaſe is ſeldom removed, and the bone crumbles away inſenſibly.

When an abſceſs forms in the anterior ſpace of the mediaſtinum, a portion of bone is removed, by a trephine, from the ſternum, to give an exit to the collected fluid.

The xypoid cartilage occaſionally takes on a diſpoſition to curl outwards, and produces conſiderable pain and uneaſineſs.

When the cartilages of the ribs are divided, and the ſternum elevated and bent back, to examine the viſcera of the thorax after death, a quantity of bloody, ſomewhat gelatinous fluid, eſcapes from the divided ends of the ſternum; this appears to be no more than the oſſeous fluid, and not a diſeaſed fluid.

OF THE LOINS.

The bones of the loins are five lumbar vertebræ, which have already been deſcribed.

OF THE PELVIS.

The pelvis, ſo named from its reſemblance to a barber's baſon *without a bottom*, conſiſts of four bones: two *oſſa innominata*, the *os ſacrum*, and the *os coccygis*, which are ſituated at the bottom of the trunk, and upon the lower extremities. It is within the cavity formed by theſe bones that the internal organs of generation are ſituated; the urinary bladder, the rectum, and occaſionally part of the ſmall inteſtines. The pelvis alſo ſerves as a firm ſupport to the upper part of the body.

> The pelvis is a part very liable to become diſtorted, eſpecially the female pelvis. The different kinds of diſtortion are fully treated by writers on midwifery.

OSSA INNOMINATA.

Oſſa ilii. Oſſa iſchii. Oſſa pubis. Oſſa coxæ. Oſſa coxendicis.

Theſe two bones conſtitute the ſides and anterior part of the pelvis, and are extremely irregular in their ſhape.

Each bone is divided into three portions, viz. *ilium*, the uppermoſt; *iſchium*, the loweſt; and *pubis*, the anterior.

EMINENCES. The *criſta of the ilium*, from which the oblique and tranſverſe muſcles of the abdomen ariſe—at its poſterior part are two *ſpinous proceſſes*, which give adheſion to ligaments—at its anterior part are alſo two *ſpinous proceſſes*; the *ſuperior* gives adheſion to the ſartorius, tenſor vaginæ femoris, and the ligament of the thigh; the *inferior anterior ſpinous proceſs*, about an inch from the former, has ariſing from it the rectus femoris. The *external ſurface* of the iliac portion is covered by the glutæi muſcles; the *internal* by the internal iliac. Upon the internal ſurface there is a *line* even with the pubis; this is called *linea innominata*, or rim of the pelvis; it divides the cavity of the abdomen from the pelvis. Upon the iſchiatic portion, or *iſchium*, are, the *tuberoſity of the iſchium*, upon which we ſit; the *ſpinous proceſs of the iſchium*, which projects backwards, and gives adheſion to the uppermoſt ſacro-ſciatic ligament; the *ramus iſchii*, which joins the pubis. Upon the pubic portion, or *pubis*, are, the *body*, near the ſocket; the *angles* and *arches* of the pubis.

CAVITIES. A *notch* between the anterior ſpines of the ilium; an *anterior* and *poſterior iſchiatic notch*; the *acetabulum*, which receives the head of the os femoris, and the *foramen thyroideum*, or *ovale*.

Each os innominatum is CONNECTED with its fellow anteriorly by ſymphyſis, with the ſacrum poſteriorly by ſtrong cartilages and ligaments, and with the head of the thigh bone by enarthroſis.

USE. To form the pelvis, to retain the gravid uterus in its ſituation, and to conſtitute the acetabulum for the thighs.

> The os innominatum, at birth, and for a long time after, conſiſts of three diſtinct bones, united together by cartilage; this probably gave riſe to theſe portions receiving diſtinct names, as *os ilii*, *os iſchii*, and *os pubis*, which in the adult form one bone, without a name, and hence the term os innominatum. The form of the adult pelvis is, nevertheleſs, perfect in the fœtus.

OS SACRUM.

The os ſacrum is a bone of a triangular ſhape, bent forwards, and ſituated at the bottom of the ſpine, and the poſterior part of the pelvis. It is by many deſcribed as a bone of the ſpine; and from the irregularities reſembling ſpinous and tranſverſe proceſſes, and its foramina, it ſeems to have ſome juſt claim to be conſidered as ſuch.

EMINENCES. Two *ſuperior oblique proceſſes*, the *appearances* of the ſpinous proceſſes, the *appearances* of the oblique and tranſverſe proceſſes, and the *appearances* of the vertebral bodies.

CAVITIES. Four pair of *external*, and four pair of *internal foramina*, and five *longitudinal middle canals*.

CONNEXION. Superiorly with the laſt lumbar vertebræ, laterally with the oſſa innominata, and inferiorly with the os coccygis.

USE. To conſtitute the pelvis, and ſuſtain the ſpine.

At birth, this bone is ſhaped like that of an adult, but this ſhape is given it by cartilage. A vaſt number of oſſified portions are embedded in the cartilage, and the ſimilarity to vertebræ is very conſpicuous.

OS COCCYGIS.

This bone, which is ſo called from its reſemblance to a cuckoo's bill, conſiſts very frequently of two, three, or four portions, which are triangular or irregularly ſhaped; they are placed at the extremity of the ſacrum.

USE. To ſuſtain the rectum, and prevent the rupture of the perinæum, in parturition.

The os coccygis, at birth, conſiſts of ſeveral portions of cartilage, and a round oſſification is occaſionally found in the uppermoſt.

It ſometimes happens, that in labour this bone is ſeparated from the ſacrum.

OF THE SUPERIOR EXTREMITIES.

The upper extremities hang from the ſuperior part of the ſides of the thorax, and are compoſed of the bones of the ſhoulder, arm, fore-arm, and hand.

OF THE SHOULDER.

The ſhoulder conſiſts of two bones, the clavicle and ſcapula, which are united together immediately over the top of the os brachii, and form what is properly termed the ſhoulder, *ſummitas humeri.*

CLAVICULA.

The clavicle or collar bone is a roundiſh bone, ſhaped like the letter *ſ*, and ſituated obliquely in the upper and lateral part of the cheſt.

Cavities. A furrow, or *groove*, of the ſubclavian veſſels on the inferior ſurface.

Use. To connect the ſcapula and humerus to the thorax, and to defend the ſubclavian veſſels.

Connexion. Anteriorly it is articulated to the ſternum, and poſteriorly to the ſcapula, by arthrodia.

> The clavicle is perfectly formed at birth; indeed it is completely ſo at the third month after conception.

SCAPULA.

Omoplata.

The ſcapular, or blade bone, is of a triangular figure, and is ſituated in the upper and lateral part of the back.

Eminences. The *ſpine*, which is in the middle of the external ſurface: its anterior termination is called the *acromion.* The *coracoid proceſs*, which ſtands out oppoſite to the acromion.

The borders of the bone are called *coſtæ*, and the corners *angles*. The circle below the articular cavity is called the *neck*.

CAVITIES. The *articular* or *glenoid* cavity, which receives the head of the humerus.

The ſcapula is UNITED with the clavicle by arthrodia, with the ribs and os hyoides by muſcle, and with the humerus by arthrodia.

USE. To defend the back, and give articulation to the humerus.

> The ſcapula, with reſpect to ſhape, is perfect at birth. The acromion and coracoid proceſſes are cartilage.

OF THE ARM.

The brachium, or arm, conſiſts of one long bone.

OS BRACHII.

Os brachiale. Os humeri.

The bone of the arm occupies the ſpace between the junction of the clavicle with the ſcapula and the fore-arm. It is a long cylindrical bone, thickeſt at its extremities.

EMINENCES. The *head*, which is rounded on its ſuperior part. The *neck*, which is immediately below the head. The *greater tubercle*, near the neck, which receives the ſupra-ſpinatus muſcles. And, the *leſſer tubercle*, which is near the former, and has fixed to it the ſubſcapularis. On the *inferior extremity* are three *condyles*, namely, an *external* and an *internal* condyle, which give origin to the flexor and extenſor muſcles of the arm; and the trochlea of the humerus.

CAVITIES. A *furrow* between the tubercles, for the long tendon of the biceps. In the *inferior extremity*, a *poſterior foſſa*, for the anconoid proceſs of the ulna; and an *anterior depreſſion*, for the coronoid proceſs.

Connexion. The humerus is connected with three bones; with the ſcapula by *arthrodia*, and the cubit and radius by *ginglymus*.

Use. To conſtitute the arm.

> This bone is perfect in its ſhape at birth, but its extremities are cartilage.

OF THE FORE-ARM.

The fore-arm is compoſed of two bones; the *ulna* and *radius*.

ULNA.

Cubitus.

This bone is long, and thicker above than below. It is placed in the inſide of the fore-arm, towards the little finger.

Eminences. The *olecranon*, or *anconoid proceſs*, upon which we lean; and the *coronoid proceſs*, which is oppoſite to it. In the lower extremity are, the *lower head*, the *neck*, and the *ſtyloid proceſs*, which gives a ſtrong adheſion to the ligament that ſecures the wriſt.

Cavities. The ſigmoid cavity, at the upper end.

Use. To conſtitute the chief ſupport of the fore-arm.

Connexion. Superiorly with the trochlea of the humerus by *arthrodia*, inferiorly with the carpus by *arthrodia*, and with the radius by *trochoides*, as in pronation and ſupination.

> The ends of the ulna, at birth, are cartilaginous; the body of the bone is very round.

RADIUS.

The radius, the leſſer bone of the two, is long and cylindrical, and ſituated in the external ſide of the fore-arm towards the thumb.

Eminences. An *upper head*, which is excavated; the *little head*, and the *ſtyloid* proceſs at the inferior extremity.

Cavity. The *glenoid cavity*, at its inferior extremity.

Use. To aſſiſt in forming the fore-arm, and to ſerve for flexion, ſupination, and pronation.

The radius is connected to the humerus by *ginglymus*, to the cubit by an interoſſeous ligament and *trochoides*, and to the carpus by *arthrodia*.

Both extremities of this bone are epiphyſes at birth.

OF THE HAND.

The bones of the hand conſiſt of thoſe of the *carpus*, *metacarpus*, and *fingers*.

CARPUS.

The *carpus*, or wriſt, is ſituated between the fore-arm and *metacarpus*. It is compoſed of eight bones, which lie cloſe to one another in a double row, one of which is ſuperior, the other inferior. In the *ſuperior row*, are (from the thumb to the little finger), *os ſcaphoides*, or *naviculare*; *os lunare*; *os cuneiforme*; and *os orbiculare*, or *ſub-rotundum*. In the *lower row* are, *os trapezium*, *os trapezoides*, *os magnum*, and *os unciforme*.

The bones of the carpus, at birth, are for the moſt part cartilage, but a ſmall round oſſification is frequently found in many of them.

Spina ventoſa, or ſuppuration of the internal ſtructure of bones, is a diſeaſe which very frequently attacks the bones of the *carpus* and *tarſus*.

METACARPUS.

The metacarpus is placed between the *carpus* and fingers. It conſiſts of five long rounded bones; one of the thumb, and four metacarpal bones of the fingers.

Use. To form the middle part of the hand.

The extremities of the metacarpal bones, at birth, are *epiphyſes.*

DIGITI MANUS.

The fingers are ſituated at the inferior extremity of the metacarpus, and conſiſt of a thumb and four fingers. The thumb has two bones, and each finger three, which are called *phalanges.*

Use. To form the fingers, which are the inſtruments of touch, defence, and labour.

OF THE INFERIOR EXTREMITIES.

The bones of the lower extremities conſiſt of thoſe of the *thigh*, *leg*, and *foot.*

OF THE THIGH.

The thigh has but one bone, which is by far the largeſt in the body, the *os femoris* or *femur.*

OS FEMORIS.

The os femoris, ſo called becauſe it bears the body, is a long cylindrical bone, thickeſt at its extremities, and ſituated between the *pelvis* and leg.

Eminences. The *head*, which is received into the acetabulum of the os innominatum, and has a ſmall *dimple* in its middle, for the attachment of the round or reſtraining ligament. The *neck*, upon which the head ſtands; it is rough, and gives attachment to the capſular ligament. The *great trochanter*, which is a large eminence below the neck, for the inſertion of the glutæi muſcles; the *little trochanter*, which receives the pſoas and iliacus internus; and a rough line on the body of the bone, called linea aſpera. On the inferior extremity are the *external* and the *internal condyle*, and between them poſteriorly a deep *notch*, for the paſſage of the great artery, vein, and nerve of the leg.

Use. To form part of the lower extremity.

The femur is connected to the acetabulum of the os innominatum by enarthröſis, and to the tibia and patella by ginglymus.

Substance. Compact on the outſide, ſpongy in the extremities, and cancellated internally.

The thigh bone, at birth, is of the ſame ſhape as the adult femur. Its head is cartilage, its inferior extremity an *epiphyſis*. The oſſification of this bone, as well as of the os brachii, begins a month after conception, and has the ſame ſhape at four months as at nine.

A longitudinal ſection of the adult femur beautifully exhibits the three ſubſtances of bones, viz. the *reticulated*, which occupies the medullary cavity; the *ſpongy*, which forms the extremities; and the *compact*, of which the ſides of the body of the bone are formed.

OF THE LEG.

The leg is that part of the lower extremity between the *femur* and foot. It conſiſts of three bones; the *tibia*, *fibula*, and *patella*.

TIBIA.

The tibia is a long, triangular, and cylindrical bone, much the thickeſt at its upper extremity, placed between the *femur* and *tarſus* in the anterior and inſide of the leg.

Eminences. The *upper head* of the tibia. The *ſpine* of the tibia, to which the great ligament of the patella is fixed. And the *lower head* of the tibia, which forms the outer ankle.

Cavities. Two *articular ſinuſes*, in the upper head, for the reception of the condyles of the femur; and the *articular cavity*, at the ſide of the head, for the reception of the fibula.

Use. To ſupport the leg, and ſerve for the flexion of the lower extremity.

The tibia is connected to the femur and patella by *ginglymus*, to the fibula by *ſyneuroſis*, and to the aſtragalus by *arthrodia*.

> Both extremities of the tibia, in fœtuſes, are cartilage; but perfectly ſhaped like thoſe of the adult. The body of the bone is more rounded.
>
> This bone is more frequently attacked with venereal nodes than any other, and particularly the anterior part.

FIBULA.

The *fibula* is a longitudinal bone, ſituated in the outer part of the leg, by the ſide of the tibia.

Eminences. The *head* of the fibula, at the upper part; and the *malleolus externus*, or outer ankle, at the lower end.

Connexion. It is connected to the tibia by an interoſſeous ligament, and to the aſtragalus by arthrodia.

Use. To form a fulcrum for the tibia, and aſſiſt in forming the leg.

> The fibula, at birth, is perfectly formed, as to ſhape; its extremities are cartilaginous.

PATELLA.

The *patella*, *rotula*, or knee-pan, is a ſmall, triangular, or heart-ſhaped ſpongy bone, ſituated between the inferior extremity of the thigh bone, and the upper part of the tibia.

It is connected to the condyles of the femur by *ginglymus*, and with the tibia by *ſyneuroſis*.

Uſe. To ſtrengthen the knee-joint, and to ſerve as a common pulley for the extenſor muſcles of the tibia.

The knee-pan is always cartilaginous at birth. Oſſification begins at different periods after birth, which depends upon the activity of the ſyſtem. At firſt the artery is ſeen to depoſit a few ſpecks of bony matter. It next appears as if the veſſel were itſelf converted into bone; a complete ring of bone is then obſerved; and at length the middle of this annulus is filled with bone, which goes on increaſing until the whole is become bone. This proceſs in the patella forms a moſt beautiful ſeries of preparations, eſpecially if injected. For this purpoſe, the knee-pans ſhould be collected at all periods before they are completely oſſified, and dried, and put into ſpirit of turpentine.

The patella is very frequently fractured. It is never united by callus, which would ſubject it to be more frequently broken; but an union is effected between the divided portions by means of ligament.

OF THE TARSUS.

The tarſus, like the carpus, conſiſts of a number of ſmall bones. They are ſeven in number, and are placed between the leg and *metatarſus*. Viewed all together, the ſuperior part of the tarſus appears headed, and this to be ſupported by a broad and ſomewhat arched baſis. The ſeven bones are diſpoſed into two rows. In the *firſt row* are, the *aſtragalus* and *os calcis*: in the *ſecond row*, the *os naviculare*, *os cubiforme*, and three *cuneiform bones*, which are placed cloſe to each other.

Eminences. The head of the aſtragalus, and the tuberoſity of the heel.

Uſe. To form the baſis of the foot, and to ſerve for its motion.

The connexion of the bones of the tarſus is with the tibia and fibula by *arthrodia*, and with the metatarſal bones, and alſo with one another, by *amphiarthroſis*.

The *os calcis* and the *aſtragalus* are become bone at birth; but the other bones are cartilaginous.

METATARSUS.

The metatarſus is ſituated between the tarſus and toes, and is compoſed of five longitudinal bones, which form the back and ſole of the foot.

DIGITI PEDIS.

The great toe is compoſed of two, and the other toes of three ſmall bones, called *phalanges*.

OSSA SESAMOIDEA.

The ſeſamoid bones are of the ſize of a ſmall pea, and ſituated occaſionally about the joints of the thumb and great toe.

DISEASED APPEARANCES OF BONES.

The bones, like other parts of the body, are ſubject to diſeaſes in which no alteration of ſtructure is perceived. Thoſe which the anatomiſt occaſionally obſerves, are, inflammation, ſuppuration, necroſis, morbid thickneſs, morbid thinneſs, mollities, hyperoſtoſis, rachitis, exoſtoſis, abſorption, præternatural joints, diaſtaſis, anchyloſis, fracture, fiſſure, tophus, ſarcoſtoſis, caries, ſpina ventoſa, and fragility.

Inflammation. Bones are ſupplied with arteries, veins, abſorbents, and nerves; and when inflammation takes place, there is perceived a greater number of veſſels carrying red blood than in a healthy ſtate;—this diſeaſed appearance is common in the bone lying immediately under old ulcers.

When inflammation attacks the internal ſtructure of bones, it forms the ſpina ventoſa.

SUPPURATION. Abſceſſes in bones are not very frequent. They are often attacked with caries, and form the ſpina ventoſa: but it ſometimes happens that the abſorbents remove a conſiderable portion of bone while pus is depoſited; and in theſe caſes the abſceſs is lined by a thick coat of coagulable lymph:—this occurs moſt frequently in ſcrophulous caries of the vertebræ.

NECROSIS. This diſeaſe conſiſts in a conſiderable portion of bone loſing its vitality, and the neighbouring veſſels taking on the oſſific action, and depoſiting a conſiderable quantity of new bone to ſupply its place. It is a ſingular fact, that in moſt of theſe caſes the dead bone is not protruded until a new one is formed. Necroſis happens moſt frequently in the cylindrical bones, as the humerus, tibia, femur, &c.

MORBID THICKNESS OF BONES. Bones are often obſerved remarkably thick, eſpecially thoſe of the calvaria; it ſometimes is the effect of rheumatic inflammation. The body of one thigh bone has likewiſe been conſiderably thickened from a depoſition of bony laminæ over the original bone; in theſe caſes the bone is conſiderably heavier than in a healthy ſtate.

MORBID THINNESS. This affection of the bones is moſtly obſerved in thoſe of the head, from rickets and hydrocephalus.

MOLLYTIES. *Malacoſteon.* In *mollities oſſium* there is a want of the due proportion of bony particles, and the bone which is formed is of a morbid nature, ſo that the whole may be bent in any direction. This diſeaſe often exiſts to ſo great a degree, that the bone may be cut with a knife.

HYPEROSTOSIS. When the whole of a bone is ſwelled or the extremity of a bone, the diſeaſe is ſo called. Anatomiſts frequently have occaſion to examine this diſeaſe in the extremity of a bone; as in white ſwellings. A conſiderable depoſition of a morbid fluid is obſerved in the cells of the bone, which is remarkably ſpongy.

Rachitis. This is merely a degree of mollities in which the bones ſwell at their extremities, and, unable to ſupport the weight of the body, too often become deformed.

Exostosis. This diſeaſe conſiſts in a bony excreſcence ariſing from a bone. The fangs of the teeth are very ſubject to exoſtoſes. When a bone has been fractured and there is a luxuriance of callus, it forms an exoſtoſis. The ſtructure of theſe unnatural formations of bone is ſimilar to that of compact healthy bone. Exoſtoſes occaſionally form to a conſiderable ſize, from the action of venereal and ſcrophulous virus, and then the diſeaſed bone is very ſpongy.

Absorption of bone. In the honeycomb caries of the cranium, which is the effect of the venereal diſeaſe, portions of bone are removed here and there, ſo as to give ſomewhat the appearance of a honeycomb. During life ſmall ulcers occupy theſe cavities. Bone is likewiſe abſorbed from preſſure; ſo that ſome of the ribs and two or three of the dorſal vertebræ are occaſionally removed, from aneuriſm.

Præternatural joints. When the patella and the collar bone of old people, and occaſionally the long cylindrical bones, are broken, the broken ends are united by ligament, and a new joint is ſometimes formed, furrounded by a capſular ligament.

Diastasis. Bones which in a healthy ſtate are united by a firm and immoveable connexion, occaſionally are ſeparated by diſeaſe to a conſiderable diſtance from each other: thus diaſtaſis of the bones of the calvaria from hydrocephalus, and diaſtaſis of the bones of the pelvis from enlarged viſcera.

Anchylosis. Bones, which in a natural ſtate are united with each other in ſuch a way as to admit of conſiderable motion, are often found united to each other by a maſs of bone interpoſing. Sections of ſuch anchyloſed joints exhibit the ends of the bones ſometimes in a healthy ſtate, and a conſiderable quantity of ſpongy bone going acroſs from each extremity. There is not unfrequently a morbid enlargement of the extremities of ſuch bones.

Fracture. The ends of fractured bones have been examined by anatomiſts at various periods after the accident, from almoſt the moment after to the time of the complete formation of callus. A coagulum of blood is firſt depoſited; in a ſhort time after, veſſels are ſeen ſhooting into this coagulum, from whoſe extremities bone is ſecreted, and the coagulum is then abſorbed. Callus becomes bone of a more or leſs compact ſtructure. When a cylindrical bone is fractured, the callus between the broken ends of the bone is a ſolid maſs, and has no medullary canal. A fractured tooth never unites again.

Fissure. The bones of the ſkull are often found cracked, or not completely divided. A fiſſure is obſerved in one table whilſt the other remains whole.

Tophus. A portion of a bone is occaſionally obſerved elevated above the natural ſurface. When examined, it is found to ariſe from a diſeaſed fluid depoſited between the external lamellæ of the bone, raiſing theſe lamellæ ſo as to form a knot, or tumour. Such diſeaſed appearances are common to the tibia, and moſtly ariſe from the action of the venereal virus.

Sarcostosis. This diſeaſe conſiſts in a loſs of a portion of a bone, and in its place a ſpongy, fleſhy excreſcence. It moſt frequently is obſerved in the cranium and tibia, and generally becomes cancerous, producing death.

Caries. When a portion of a bone is deprived of its perioſteum from diſeaſe, ſo that a gritty ſenſation may be felt by touching it with a probe, it is ſaid to be carious. The whole carious portion is often ſeparated altogether, when the bone is ſaid to exfoliate; but it frequently happens, that in caries of the ſpongy bones the bone crumbles inſenſibly away until the whole is loſt: this happens to the ſternum, carpal, tarſal bones, and vertebræ; whilſt the long cylindrical bones, the calvaria, ribs, &c. moſtly, when carious, exfoliate.

Spina ventosa. Caries of the internal ſtructure of bones often comes under the examination of the anatomiſt. A ſpina ventoſa, or ſuppuration in the medullary canal of the femur, has given riſe to a tumour the ſize of a human head. When the carpal and tarſal bones are examined with this diſeaſe, their internal ſtructure is found carious and crumbling away.

Fragility. When there are more earthy particles depoſited than in a healthy ſtate, the bones are extremely brittle. This is obſerved in the bones of very old people; ſuch bones being commonly fractured by a force which, if applied to a young and healthy bone, would ſcarcely affect it.

Bone converted into chalk. The extremities of the metatarſal bones, and of the phalanges of ſome gouty people, are occaſionally found converted into an earthy maſs of a chalky whiteneſs. This ſubſtance often fills the joint, ſo as to anchyloſe it.

COLOUR OF BONES.

The natural colour of recent bones is various: in the fœtus they are red; blueiſh in youth; and white in old age.

By feeding animals, as pigs, pigeons, rabbits, &c. with madder, the bones become of a beautiful red colour.

VESSELS AND NERVES OF BONES.

Bones have always their arteries ariſing from contiguous trunks, and their veins return the blood into thoſe in the neighbourhood. In the larger and cylindrical bones there is a canal for theſe veſſels. The nerves paſs in, along with the arteries, from contiguous branches. The abſorbents come out with the veins.

PERIOSTEUM.

Definition. A membrane which inveſts the external ſurface of all the bones except the crowns of the teeth.

Names. *Pericranium*, on the cranium; *periorbita*, on the orbits; *perichondrium*, when it covers cartilages; and *perideſmium*, when it covers ligaments.

Substance. Fibrous, furniſhed with arteries, veins, nerves, and abſorbent veſſels.

Connexion. The perioſteum coheres very firmly by means of veſſels with the ſubſtance of bones, and its external ſurface is connected with cellular membrane, muſcles, and ligaments.

Use. To diſtribute the veſſels on the external and internal ſurfaces of bones.

Diseased appearances. *Inflammation*, in which there is a greater quantity of red veſſels than in health, and a general thickening. *Gummi*, or an elevation of the perioſteum, from a ſpongy thickening.

Many have contended for the inſenſibility of the perioſteum; in a diſeaſed ſtate, however, it is highly ſenſible, and often gives excruciating pain.

In ſome birds the perioſteum is black, and green in ſome fiſh.

CARTILAGES.

Definition. White, elaſtic, gliſtening ſubſtances, growing to the bones.

Division. Into *obducent*, which cover the articulatory ſurfaces of bones; *inter-articular*, which are not accreted to the bones, but adhere to the capſular ligament, and lie between the articulating extremities, as in the knee-joint, &c.; and *uniting* cartilages, which unite bones firmly together, as the ſymphyſis pubis, bodies of the vertebræ, &c.

Use. To lubricate the articulation of the cartilages; to connect ſome bones by an immoveable connexion; and to facilitate the motion of ſome articulations.

The diſeaſes of cartilages are little, if at all, underſtood.

OSTEOGENY;

OR,

DOCTRINE OF THE FORMATION AND GROWTH OF BONES.

In what manner bones are firſt formed has long been a matter of diſpute. Duhamel was of opinion that they were formed from layers of the perioſteum, which gradually oſſified. This plauſible doctrine, taught for many years, was at length oppoſed by Detleff, who, under the direction of Haller, made many experiments to prove its fallacy. He was of opinion, from repeated obſervations, that the firſt rudiments of bone are a glutinous ſubſtance, which quickly aſſumes the conſiſtence of cartilage, and then proceeds more ſlowly to the firmneſs of bone. This hypotheſis is now abandoned. Modern phyſiologiſts are of opinion, that *oſſification* is a ſpecific action of ſmall arteries, by which oſſific matter is ſeparated from the blood, and depoſited where it is required.

The firſt thing obſervable in the embryo, where bone is to be formed, is a tranſparent *jelly*, which becomes gradually firmer, and is formed into *cartilage*. The cartilage gradually increaſes to a certain ſize, and, when the proceſs of oſſification commences, vaniſhes as it advances. Cartilages, previous to the oſſification, are ſolid, and without any cavity; but when the oſſific action of the arteries is about to commence, the abſorbents become very active, and form a *ſmall cavity*, in which the bony matter is depoſited; bone continues to be ſeparated, and the abſorbents model the maſs into its required ſhape.

The proceſs of oſſification is extremely rapid in utero; it advances ſlowly after birth, and is not completed in the human body till about the twentieth year.

Oſſification in the flat bones, as thoſe of the ſkull, always begins from *central points*, and the radiated fibres meet the radii of other oſſifying points, or edges of the adjoining bone.

In long bones, as thoſe of the arm and leg, the clavicle, metacarpal and metatarſal bones, a *central ring* is formed in the body of the bone, the head and extremities being cartilage, in the centre of which oſſification afterwards begins. The central ring of the body ſhoots its bony fibres towards the head and extremities, which extend towards the body of the bone. The head and extremities at length come ſo cloſe to the body as to be merely ſeparated by a cartilage, which becomes gradually thinner until the twentieth year.

Thick and round bones, as thoſe of the tarſus, carpus, ſternum, and patella, are at firſt all cartilage; oſſification begins in the centre of each.

At birth the *bones of the fœtus* are very imperfect. The extremities and proceſſes of almoſt all the long bones are connected to the body of the bone by cartilage. Theſe portions of bone are called *epiphyſes*. The cranium has no ſutures; its bones are connected together by a firm and almoſt cartilaginous membrane. On the anterior part of the cranium, between the parietal bones and the frontal, is a conſiderable membranous ſpace, called the *anterior fontanel*, and a ſimilar but ſmaller one between the parietal bones and the occipital, termed the *poſterior fontanel*. The frontal bone conſiſts of two bones, and the occipital of four. The teeth are partly formed, eſpecially the enamel, and are placed in a double ſeries. The external auditory foramen is ſurrounded by a *bony circle*, in which there is a groove for the attachment of the membrana tympani:—this circle gradually elongates into the meatus auditorius. The articular cavities of all the bones are much more ſhallow than in the adult. The os innominatum conſiſts of three bones, the ilium, iſchium, and pubis, which are connected together by very firm cartilage. The bodies of the vertebræ and its proceſſes are united by cartilages.

OF THE CONNEXION OF BONES.

BONES are connected with one another, ſo as to admit of motion, and this kind of union is termed *diarthroſis*; or ſo as to admit of no motion, which is termed *ſynarthroſis*; and when connected with one another by an intervening ſubſtance, the union is termed *ſymphyſis*. Diarthroſis, ſynarthroſis, and ſymphyſis, are to be conſidered as the genera only of articulations, each genus comprehending ſeveral ſpecies, which are arranged as follows.

Genera.	*Species.*
DIARTHROSIS, or *moveable Connexion.*	*Enarthroſis*, when the round head of one bone is received into the deep cavity of another, ſo as to admit of motion in every direction; as the head of the os femoris with the acetabulum of the os innominatum.
	Arthrodia, when the round head of a bone is received into a ſuperficial cavity of another, ſo as to admit of motion in every direction; as the head of the humerus with the glenoid cavity of the ſcapula.
	Ginglymus, when the motion is only flexion and extenſion; thus the tibia is articulated with the os femoris; and the cubit and radius with the os humeri.
	Trochoides, when one bone rotates upon another; as the firſt cervical vertebra upon the odontoid proceſs of the ſecond, and the radius upon the ulna, or cubit.
	Amphiarthroſis, when there is motion, but that very obſcure; as the motion of the metacarpal and metatarſal bones.
SYNARTHROSIS, or *immoveable Connexion.*	*Suture*, when the union is by means of dentiform margins; as in the bones of the cranium; hence the ſagittal, lambdoidal or occipital, and coronal ſutures.
	Harmony, when the connexion is by means of rough margins, not dentiform; as in the bones of the face.
	Gomphoſis, when one bone is fixed within another, like a nail in a board; as the teeth in the alveoli of the jaws.

Genera.	*Species.*
SYMPHYSIS, or *mediate Connexion*.	*Synchondroſis*, when a bone is united with another by means of an intervening cartilage; as the vertebræ and bones of the pubis. *Syſſarcoſis*, when a bone is connected with another by means of an intervening muſcle; as the os hyoides with the ſternum. *Syneuroſis*, when a bone is united to another by an intervening membrane; as the bones of the head of the fœtus. *Syndeſmoſis*, when a bone is connected to another by means of an intervening ligament; as the radius with the ulna, &c. *Synoſtoſis*, when two bones, originally ſeparated, are united to one another by bony matter.

SYNDESMOLOGY;

OR,

DOCTRINE OF THE LIGAMENTS.

LIGAMENTS are elaſtic and ſtrong membranes connecting the extremities of the moveable bones.

DIVISION. Into *capſular*, which ſurround joints like a bag, and *connecting* ligaments.

USE. The capſular ligaments connect the extremities of the moveable bones, and prevent the efflux of ſynovia; the external and internal connecting ligaments ſtrengthen the extremities of the moveable bones.

Ligaments of the lower jaw.—The condyles of the lower jaw are connected with the articular ſinuſes of the temporal bone by two ligaments, the *capſular* and *lateral ligament.*

Of the occipital bone, and vertebræ of the neck.—The condyles of the occipital bone are united with the articular depreſſions of the firſt vertebra by the *capſular*, *broad*, *anterior*, and *poſterior ligaments*, the *ligaments of the odontoid proceſs*, and *ligamentum nuchæ.*

Of the vertebræ.—The vertebræ are connected together by means of their bodies and oblique proceſſes. The bodies, by a ſoft cartilaginous ſubſtance, and the proceſſes by ligaments, viz. the *tranſverſe ligament* of the firſt vertebra; the *anterior* and *poſterior common*; the *interſpinous*; the *intertranſverſe*; the *intervertebral ligaments*; the *capſular ligaments* of the oblique proceſſes; and the ligaments of the laſt vertebra of the loins with the os ſacrum.

Of the ribs.—The poſterior extremity of the ribs is united with the vertebræ; the anterior with the ſternum. The ligaments of the poſterior extremity are, the *capſular ligaments* of the greater and leſſer heads; the *internal* and *external ligaments* of the neck of the ribs; and a ligament *peculiar* to the laſt rib. The ligaments of the anterior extremity are, the *capſular* ligaments of the cartilages of the true ribs, and the ligaments of the ribs *inter ſe.*

Of the ſternum.—The ligaments connecting the three portions of the ſternum to the ribs are, the *membrana propria* of the ſternum; and the ligaments of the enſiform cartilage.

Of the pelvis.—The ligaments which connect the oſſa innominata with the os ſacrum are, three *ligamenta ilio-ſacra*, two *ſacro iſchiatic ligaments*, two *tranſverſe* ligaments of the pelvis, the *ligamentum obturans* of the *foramen ovale*, and the *ligamentum Poupartii*, or *inguinale.*

Of the os coccygis.—The baſis of the os coccygis is connected to the apex of the os ſacrum by the *capſular* and *longitudinal* ligaments.

Of the clavicle.—The anterior extremity is connected with the ſternum and firſt rib; and the poſterior extremity with the acromion of the ſcapula, by the *interclavicular*, the *capſular* ligament, the *ligamentum rhomboideum*; and in the poſterior extremity, the *capſular* ligament.

Of the ſcapula.—The proper ligaments which connect the ſcapula with the poſterior extremity of the clavicle are, the *conoid* and *trapezoid* ligaments.

Of the humerus.—The head of the humerus is connected with the glenoid cavity of the ſcapula by the *capſular* ligament.

Of the articulation of the cubit.—The elbow joint is formed by the inferior extremity of the humerus, and ſuperior extremities of the ulna and radius. The ligaments connecting theſe bones are, the *capſular*, the *brachio-cubital*, and the *brachio-radial* ligaments.

Of the radius.—The radius is affixed to the humerus, cubit, and carpus, by peculiar ligaments, namely, the *ſuperior*, *inferior*, *oblique*, and *interoſſeous* ligaments.

Of the carpus.—The ligaments which connect the eight bones of the wriſt together, and with the fore-arm and metacarpus, are, the *capſular* ligament of the carpus, the firſt and ſecond *tranſverſe* ligament, the *oblique* ligament, and the *capſular* ligament proper to the bones of the carpus.

Of the metacarpus.—The bones of the metacarpus are in part connected with the ſecond row of bones of the carpus, and in part together, by the articular and interoſſeous ligaments.

Of the fingers.—The fingers and phalanges are connected together, and with the metacarpus; and the thumb with the carpus by the *lateral* ligaments of the fingers, and ligament of the thumb with the os trapezium of the carpus.

Of the hand.—The ligaments which keep the tendons of the muſcles of the hand in their place, are ſituated partly in the palm and partly on the back of the hand. In the back of the hand are, the *external tranſverſe* ligament of the carpus, the *vaginal* and the *tranſverſe* ligaments of the extenſor tendons. In the palm of the hand are, the *internal tranſverſe* ligament of the carpus, the *vaginal* or *crucial* ligaments of the flexor tendons of the phalanges, and the *acceſſory* ligaments of the flexor tendons.

Of the articulation of the femur.—The head of the os femoris is ſtrongly annexed to the acetabulum of the os innominatum, by two very ſtrong ligaments—the *capſular* ligament, and *ligamentum teres*, or reſtraining ligament.

Of the articulation of the knee.—The knee joint is formed by the condyles of the os femoris, head of the tibia, and patella. The ligaments are, the *capſular*, the *poſterior*, the external and the internal *lateral* ligaments, the *crucial* and the *alar* ligaments, the ligaments of the ſemilunar cartilages, and ligaments of the patella.

Of the fibula.—The fibula is connected with the tibia by means of the *capſular* ligament of the ſuperior extremity, the *interoſſeous* ligament, and the ligaments of the inferior extremity.

Of the articulation of the tarſus.—The inferior extremity of the tibia and fibula forms the cavity into which the aſtragalus of the tarſus is received. This articulation is effected by the *anterior*, *middle*, and *poſterior* ligaments of the fibula, the *ligamentum tibiæ deltoides*, the *capſular* ligament, and the ligaments *proper* to the bones of the tarſus.

Of the metatarſus—The bones of the metatarſus are connected in part together, and in part with the tarſus, by means of the *capſular* ligament, the *articular* ligaments, the *tranſverſe* ligaments in the back and ſole of the foot, and the *interoſſeous* ligaments of the metatarſus.

Of the toes.—The phalanges of the toes are united partly together, and partly with the metatarſus, by the *capſular* and *lateral* ligaments.

The ligaments which reſtrain the muſcles of the foot in their proper places are found partly in the back and partly in the ſole of the foot. They are the *vaginal* ligament of the tibia, the *tranſverſe* or *crucial* ligaments of the tarſus, the ligaments of the tendons of the peronei muſcles, the *laciniated* ligament, the *vaginal* ligament of the extenſor muſcle and flexor pollicis, the *vaginal* ligaments of the flexor tendons, the *acceſſory* ligaments of the flexor tendons, and the tranſverſe ligaments of the extenſor tendons.

MYOLOGY;

OR,

DOCTRINE OF THE MUSCLES.

A MUSCLE is a fibrous body, divided into *head*, *belly*, and *tail*.

ADHESION. The head and tail are firmly attached to the bones; the place of attachment of the former is called its *origin*; it is uſually that part neareſt the trunk of the body: the latter is termed the *inſertion*, which is more remote from the trunk of the body, and is implanted into the part to be moved. The body adheres laxly to other parts, by means of the cellular membrane, in order that it may ſwell when the muſcle acts.

Substance. Fleſhy in the belly, tendinous in the extremities. The former is compoſed of fleſhy fibres, which are irritable and ſenſible; the latter of white fibres, which are neither ſenſible nor irritable. When the tendinous extremity of a muſcle is rounded, it is called a *tendon*; when broad and expanded, *aponeuroſis*, and ſometimes *faſcia*.

Muſcles are variouſly named, according to the arrangement of their fibres, or from their action, or from their origin and inſertion, or from their figure or ſituation; thus, when the fibres go in the ſame direction, it is ſaid to be a *ſimple* muſcle; when they are in rays, a *radiated* muſcle; when arranged like the plume of a feather, a *penniform* muſcle; and, when two penniform muſcles are contiguous, a *compound penniform*. Muſcles ſometimes ſurround certain cavities of the body, forming a thin lamina, as in the inteſtinal canal, bladder, &c. When they are ſituated around any opening, ſo as to ſhut or open it, they are termed *ſphincters*. There are many muſcles named from their action, as the *flexors*, *extenſors*, *depreſſors*, *levators*, *corrugatores ſupercilii*, &c. The muſcles which receive names from their origin and inſertion are very numerous; as the *ſterno-cleido-maſtoideus*, *ſtylo-hyoideus*, *ſtylo-gloſſus*, &c. The *deltoid*, *pectineus*, *pyramidalis*, &c. are named from their figure; and the *pectoralis*, *lingualis*, *temporalis*, *pterygoideus*, &c. from their ſituation. Muſcles that concur in producing the ſame action, are called *congeneres*; and thoſe that act contrary to each other, *antagoniſtæ*.

Vessels. Arteries, veins, and abſorbents abound in the fleſhy part; but very few indeed in the tendinous.

Nerves of muſcles are alſo numerous in the fleſhy parts, and wanting in the tendinous.

Use. Muſcles are the organs of motion.

MUSCLES OF THE INTEGUMENTS OF THE CRANIUM.

Occipito-frontalis *.—*Epicranius, Occipitalis et frontalis. Digaſtricus capitis.*—A broad, thin, muſcular expanſion, which *ariſes* from the upper ridge of the occipital bone, covers the back part of the head, from the maſtoid proceſs of one ſide around to that of the other ſide, becomes a flat aponeuroſis on the top of the head, and is *inſerted* into the ſkin and eyebrows, and the bone in that neighbourhood. The uſe of this muſcle is to pull the ſkin of the head backwards, to raiſe the eyebrows, and corrugate the ſkin of the forehead.

Corrugator supercilii.—This muſcle appears like a ſlip of the former; it ariſes above the root of the noſe, and is inſerted amongſt the fibres of the occipito-frontalis. Its uſe is to wrinkle the eyebrows, by drawing them together.

MUSCLES OF THE EYELIDS.

Orbicularis palpebrarum.—This muſcle *ariſes* and is inſerted by the ſame ſmall tendon at the inner angle of the orbit. It is a neat, regular, flat muſcle, ſurrounding the eye, which it ſqueezes with violence when injured, as by duſt.

Levator palpebræ superioris.—A ſmall muſcle, ariſing by a flat tendon, deep within the orbit, near the optic foramen; it becomes fleſhy as it paſſes the eyeballs, and ends in the eyelid by a broad expanſion of muſcular fibres, which finally terminate in a ſhort flat tendon. It opens the eye by raiſing the upper eyelid.

⁂ *The reader will be pleaſed to obſerve, that though all the muſcles (a few only excepted, which are marked thus *) are in pairs, mention is made here only of the muſcles of one ſide.*

MUSCLES

MUSCLES OF THE EYEBALL.

The eyeball is completely ſurrounded by muſcles, which move it in every direction. They ariſe from the very bottom of the orbit, around the optic foramen, and are implanted into the upper, under, and lateral ſurfaces of the ſclerotic coat of the eye; and the expanſions of their colourleſs tendons, form the tunica adnata, or white of the eye; theſe are termed *recti.* Beſides theſe, there are two whoſe action turns the eye obliquely.

RECTUS SUPERIOR.—*Attollens oculi. Levator oculi. Superbus.*—This muſcle lifts the eye directly upwards, and is expreſſive of pride and haughtineſs.

RECTUS INFERIOR.—*Deprimens oculi. Humilis.*—This is directly oppoſite to the former muſcle, and is expreſſive of modeſty and ſubmiſſion.

RECTUS INTERNUS.—*Adducens oculi. Bibitorius.*—This moves the eye towards the noſe.

RECTUS EXTERNUS.—*Abductor oculi. Indignabundus.*—This muſcle turns the eye outwards. When the recti muſcles all act in ſucceſſion, they roll the eye; but if they act all at once, the eye is immoveable.

OBLIQUUS INFERIOR.—*Longiſſimus oculi. Trochlearis.*—This *ariſes* with the former, from the bottom of the orbit, by a ſlender tendon, paſſes the upper part of the eyeball fleſhy, then forms a ſmooth round tendon, which paſſes through a cartilaginous pulley in the margin of the orbit, and returns down to be inſerted in the middle of the eyeball.

OBLIQUUS INFERIOR.—*Breviſſimus oculi.*—This muſcle is oppoſed to the former in form, place, and office. It *ariſes* from the naſal proceſs of the ſuperior maxillary bone, in the edge of the orbit, and paſſes obliquely backwards and outwards under the ball of the eye, to be inſerted oppoſite to the obliquus ſuperior.

MUSCLES OF THE NOSE AND MOUTH.

LEVATOR LABII SUPERIORIS ALÆQUE NASI.—*Pyramidalis. Dilator alæ naſi.*—A neat, delicate, pyramidal muſcle, ariſing by a ſmall double tendon from the naſal proceſs of the ſuperior maxillary bone, and ſpreading as it paſſes down the noſe to be implanted by two faſciculi, one into the cartilage of the noſe, and the other into the upper lip. Its office is to raiſe the upper lip, and dilate the noſtrils.

LEVATOR LABII SUPERIORIS PROPRIUS.—*Muſculus inciſivus.*—Ariſes immediately under the edge of the orbit, and above the inciſors, by a broad flat origin, and runs downwards and obliquely inwards to the middle of the lip, where it meets its fellow. It pulls the upper lip directly upwards.

LEVATOR ANGULI ORIS.—*Levator labiorum communis. Caninus.*—The origin of this muſcle is between the infra-orbitar foramen of the ſuperior maxillary bone and the firſt molaris, immediately above the canine tooth. It is inferted into the fibres of the *orbicularis oris*, at the corner of the mouth, ſo that it raiſes the angle of the mouth upwards.

ZYGOMATICUS MAJOR.—*Diſtortor oris.*—Ariſes from the cheek bone, near the zygomatic ſuture; runs downwards and inwards to the corner of the mouth, and is loſt in the fibres of the *orbicularis oris*, and depreſſor of the lip. Its action is that of diſtorting the mouth in laughter, rage, grinning, &c.

ZYGOMATICUS MINOR.—Ariſes higher than the former from the cheek bone. It is a much more ſlender muſcle than the major, and is often wanting.

BUCCINATOR.—A large flat muſcle which forms the ſides of the cheek. It ariſes chiefly from the coronoid proceſs of the lower jaw, and from the ſuperior maxillary bone, cloſe by the pterygoid proceſs of the ſphænoid bone, and proceeds directly forwards to be implanted into the corner of the mouth. In its middle it is perforated by the duct of the parotid gland. Its *uſe* is to flatten the cheek, aſſiſt in ſwallowing liquids, turning the morſel in the mouth while chewing: in blowing wind inſtruments, it both receives and expels the wind;—hence its name.

DEPRESSOR ANGULI ORIS.—*Triangularis labiorum.*—A triangular muſcle ariſing fleſhy from the edge of the lower jaw. It gradually grows ſmaller as it runs upwards to be implanted in the angle of the mouth, which it draws downwards.

DEPRESSOR LABII INFERIORIS.—*Quadratus genæ.*—A ſmall ſquare muſcle which ariſes under the depreſſor anguli oris, and goes obliquely upwards and inwards, until it meets its fellow in the middle of the lip, where it mixes with the fibres of the *orbicularis.* It pulls the lip downwards.

ORBICULARIS ORIS*.—*Conſtrictor oris. Sphincter oris. Oſculator. Semi-orbicularis ſuperior et inferior. Naſalis labii ſuperioris.*—A regularly round muſcle, an inch in breadth, ſurrounding the mouth after the manner of the orbicularis oculi, and conſtituting the thickneſs of the lips. There is a croſſing of the fibres at the angles of the mouth, which has induced ſome to conſider it as two ſemicircular muſcles. Often there is a ſmall ſlip going from the middle of the upper lip to the noſe, called *naſalis labii ſuperioris.* The orbicularis contracts the mouth, and antagonizes with the muſcles inſerted into it.

DEPRESSOR LABII SUPERIORIS ALÆQUE NASI.—*Inciſivus medius. Conſtrictor, vel compreſſor alæ naſi.*—A very ſmall muſcle concealed under the former. It ariſes from the ſocket of the fore teeth, and goes into the root of the cartilage of the noſe and upper lip, which it pulls down.

Constrictor nasi.—*Compreſſor naſi.*—A ſmall ſcattered bundle of muſcular fibres, which croſſes the cartilage of the noſe, and goes to the very point of the noſe, meeting on the top with its fellow.

Levator menti.—*Levator labii inferioris. Inciſivus inferior.*—Ariſes from the lower jaw, at the root of the inciſors, and is inſerted into the ſkin on the very centre of the chin. By its contraction it draws the centre of the chin into a dimple, and moves the lip at the ſame time.

MUSCLES OF THE EXTERNAL EAR.

Superior auris.—*Attollens.*—A very thin flat expanſion of muſcular fibres, ſcarcely diſtinguiſhable from the faſcia of the temporal muſcle, upon which it lies It ariſes broad and circular from the expanded tendon of the occipito-frontalis, and is inſerted narrow into the root of the cartilaginous tube of the ear. It appears to have been intended to lift the ear upwards.

Anterior auris.—A delicate, thin, narrow expanſion, ariſing from near the back part of the *zygoma*, and inſerted into the eminence behind the helix. This muſcle is frequently not to be diſtinguiſhed from the former. Its uſe is to raiſe the eminence forwards.

Posterior auris.—*Retrahens auris. Triceps auris.*—A very ſmall, delicate, thin muſcle, ariſing by three narrow diſtinct ſlips from about the maſtoid proceſs of the temporal bone, and going directly forwards to be inſerted into the concha. Its uſe is to draw the ear back, and ſtretch the concha.

Helicis major.—Ariſes from the anterior and acute part of the helix; is inſerted into the cartilage of the helix, a little above the tragus. It depreſſes the upper part of the helix.

Helicis minor.—Ariſes lower than the former, and is inſerted into the crus of the helix. Its uſe is to contract the fiſſure.

TRAGICUS.—This muſcle lies upon the concha, and ſtretches to the tragus. It depreſſes the concha, and pulls the tragus a little outwards.

ANTITRAGICUS.—A very ſmall muſcle lying in the antitragus. It dilates the mouth of the concha.

TRANSVERSUS AURIS.—Ariſes from the upper part of the concha, and is inſerted into the inner part of the helix. It draws theſe parts together.

MUSCLES OF THE INTERNAL EAR.

LAXATOR TYMPANI.—This muſcle ariſes from the ſpinous proceſs of the ſphænoid bone, proceeds into the cavity of the tympanum to be inſerted into the long proceſs of the malleus. Its uſe is to draw the malleus obliquely forwards towards its origin.

TENSOR TYMPANI.—Ariſes from the cartilaginous extremity of the Euſtachian tube, within the tympanum, and is inſerted into the *manubrium* of the malleus. By contracting, this muſcle pulls the malleus and membrana tympani inwards.

STAPEDIUS.—This delicate muſcle ariſes from a little cavern in the tympanum, near the cells of the maſtoid proceſs, and paſſes in a bony furrow to be inſerted into the poſterior part of the head of the ſtapes, which, by contracting, it draws upwards.

MUSCLES OF THE LOWER JAW.

TEMPORALIS.—This great muſcle of the lower jaw ariſes from a ſemicircular ridge in the lower part of the parietal bone, and from the ſphænoid, temporal, and frontal bones in the hollow behind the eye, where they meet to form the ſquamous ſuture, and from the aponeuroſis which covers it. Its fibres are bundled together, and paſs in a narrow compaſs under the zygoma to be inſerted all around the coronoid proceſs of the lower jaw. Its uſe is to pull the lower jaw upwards, which it does very powerfully.

Spaſm of this muſcle conſtitutes *triſmus*, or locked-jaw.

MASSETER.—A ſhort, thick, fleſhy muſcle, which gives roundneſs to the back part of the cheek. It ariſes from the ſuperior maxillary bone, near its junction with the cheek bone, and alſo from the lower edge of the zygoma, and paſſes over the coronoid proceſs of the lower jaw, and covers that part of the jaw quite down to its angle, where it is inſerted. The parotid gland lies on the upper part of the maſſeter, and its duct paſſes over it as it croſſes the cheek. The office of this muſcle is the ſame as the temporalis.

PTERYGOIDEUS INTERNUS. — *Pterygoideus minor.* — Ariſes from the internal or flat pterygoid proceſs of the ſphænoid bone, and paſſes downwards and outwards to be inſerted into the angle of the jaw on its inſide. When this muſcle contracts, it raiſes the jaw, and draws it a little to one ſide.

PTERYGOIDEUS EXTERNUS. — *Pterygoideus major.* — This ariſes from the external pterygoid proceſs, and paſſes directly outwards, not downwards, to be implanted into the lower jaw, juſt below the capſular ligament, to a part of which it is connected. The uſe of this muſcle is to move the jaw, and prevent the capſular ligament from being pinched.

MUSCLES WHICH APPEAR ABOUT THE ANTERIOR PART OF THE NECK.

PLATYSMA MYOIDES.—*Muſculus cutaneus. Latiſſimus colli. Quadratus genæ.* — This delicate, flat, and expanded muſcle ariſes from the cellular membrane covering the pectoral and deltoid muſcles. Its fibres paſs upwards to be inſerted into the ſide of the chin and integuments of the cheek. When this muſcle contracts, it pulls the ſkin of the cheeks and face downwards.

Sterno-cleido-mastoideus.—*Sterno maſtoideus*, and *cleino-maſtoideus. Maſtoideus.*—This ariſes from the upper part of the ſternum, and by another head from the fore part of the clavicle. Theſe two portions paſs upwards and outwards, unite and form a big, ſtrong, round muſcle, which is inſerted into the maſtoid proceſs. When one of theſe muſcles acts, the head is pulled to one ſide; but, when both contract together, the head is bent forward.

Spaſm of this muſcle cauſes the wry neck, or *caput obſtipum.*

MUSCLES SITUATED BETWEEN THE LOWER JAW AND OS HYOIDES.

Digastricus.—*Biventer maxillæ inferioris.*—This muſcle ariſes fleſhy from the notch along the root of the maſtoid proceſs of the temporal bone, goes obliquely forwards and downwards, and becomes a long, thick, and round tendon, which perforates the ſtylo-hyoideus muſcle, and is affixed by a tendinous bridle to the os hyoides; then turning upwards towards the chin becomes again fleſhy, and is inſerted into the lower and anterior part of the chin. When the jaw is fixed, as in ſwallowing, this muſcle raiſes the os hyoides; but when the os hyoides is fixed, it pulls down the jaw.

Mylo-hyoideus.—A flat and broad muſcle ariſing from the whole ſemicircle of the lower jaw internally, and proceeding with very regular ſtraight fibres to the baſis of the os hyoides. It is divided from its fellow by a white tendinous line, which xtends from the ſymphyſis of the jaw to the os hyoides. When theſe muſcles contract, the os hyoides is moved upwards.

Genio-hyoideus. — *Muſculus polychreſtus.* — A ſmall neat muſcle, which ariſes from the rough point of the chin, and proceeds downwards, becoming flat and broad, to be implanted into the baſis of the os hyoides. When the jaw is fixed, theſe muſcles move the os hyoides forwards and upwards, and when the os hyoides is fixed, they pull the jaw down.

Genio-glossus.—Ariſes by a narrow-pointed origin from the rough tubercle behind the ſymphyſis of the chin; ſpreads out like a fan as it proceeds towards the tongue, whoſe ſubſtance it chiefly forms. It moves the tongue in various directions.

Hyo-glossus.—*Baſio-gloſſus. Chondro-gloſſus. Cerato-gloſſus. Baſio-chondro-cerato-gloſſus.*—This muſcle ariſes by three faſciculi (one from the baſis, one from the horn, and the other from the cartilage of the os hyoides), which proceed upwards with very ſlight marks of any diviſion, to be inſerted into the ſide of the tongue, which they pull downwards; and when both act, the tongue is made ſomewhat round.

Lingualis.—This muſcle ariſes from and is inſerted into the tongue. It is an irregular bundle of fibres, which runs along the ſide between the ſtylo-gloſſus and the genio-gloſſus, unconnected with any bone. The tongue is ſhortened and drawn backwards by theſe muſcles.

MUSCLES SITUATED BETWEEN THE OS HYOIDES AND TRUNK.

Sterno-hyoideus. — A flat, broad, riband-like muſcle, which ariſes from the upper part of the ſternum, rather within the breaſt, and partly alſo from the clavicle and cartilage of the firſt rib, and goes ſtraight up to be implanted into the baſe of the os hyoides, which it draws downwards.

OMO-HYOIDEUS.—*Coraco-hyoideus.*—This is a very long thin muſcle, ariſing from the ſcapula near the coracoid proceſs, and paſſing around the throat to be inſerted into the ſide of the os hyoides. When one of theſe muſcles acts, the os hyoides is pulled to one ſide, and when both act it is pulled downwards.

STERNO-THYROIDEUS.—This muſcle lies under the ſterno-hyoideus, which it very much reſembles, except that it is much ſhorter. It ariſes immediately under it, from the ſternum and cartilage of the firſt rib, and goes upwards to be inſerted into a rough ridge in the thyroid cartilage, which it pulls downwards.

HYO-THYROIDEUS.—*Thyreo-hyoideus.*—Ariſes from the baſis and horn of the os hyoideus, and goes down to be implanted into the lower border of the thyroid cartilage. It raiſes the thyroid cartilage, and depreſſes the os hyoides.

CRICO-THYROIDEUS.—A very ſhort muſcle paſſing from the upper edge of the cricoid to the lower margin of the thyroid cartilage. It pulls the thyroid towards the cricoid cartilage.

MUSCLES SITUATED BETWEEN THE LOWER JAW AND OS HYOIDES LATERALLY.

STYLO-GLOSSUS.—Ariſes from the ſtyloid proceſs of the temporal bone, goes obliquely downwards and forwards to be inſerted into the ſide of the tongue in a radiated form, ſo as to make part of the fleſh of the tongue. Its office is to pull the tongue backwards into the mouth.

STYLO-HYOIDEUS.—*Stylo-hyoideus alter.*—Ariſes, like the former, from the ſtyloid proceſs, and goes obliquely downwards and forwards to be inſerted into the ſide of the os hyoides. Juſt above its inſertion, its fibres are ſlit ſo as form a ſmall loop for the tendon of the digaſtricus to paſs through. The ſtylo-hyoideus is ſometimes accompanied by a ſmall fleſhy muſcle, called *ſtylo-hyoideus alter.* Theſe muſcles draw the os hyoideus upwards.

STYLO-PHARYNGÆUS.—This ariſes from the root of the ſtyloid proceſs. It is a long, ſlender muſcle, expanding its fibres upon the ſide of the pharynx. It lifts the pharynx up to receive the food, and then ſtraitens and compreſſes it to puſh the morſel down the œſophagus.

CIRCUMFLEXUS PALATI.—*Tenſor palati. Palato-ſalpingus. Staphilinus externus. Sphæno-ſalpingo-ſtaphilinus. Muſculus tubæ. Pterygo-ſtaphilinus.*—This muſcle ariſes from the ſpinous proceſs of the ſphænoid bone, and from the beginning of the Euſtachian tube, along with which it runs down betwixt the pterygoid proceſſes; it then becomes tendons, and turns around the hamulus of the pterygoid proceſs to aſcend again to the ſide of the velum: hence, when in action, the ſoft palate is made tenſe, by being drawn downwards.

LEVATOR PALATI MOLLIS.—*Salpingo-ſtaphilinus. Sphæno-ſtaphilinus. Pterygo-ſtaphilinus. Petro-ſalpingo-ſtaphilinus.*—This ariſes from the point of the petrous portion of the temporal bone, from the Euſtachian tube, and alſo from the ſphænoid bone, from which it deſcends to the velum pendulum palati, and ſpreads out in it. When theſe muſcles contract, the ſoft palate is raiſed againſt the poſterior opening of the noſtrils, and the opening of the Euſtachian tube, whilſt any thing is paſſing into the pharynx.

MUSCLES SITUATED ABOUT THE ENTRY OF THE FAUCES.

CONSTRICTOR ISTHMI FAUCIUM.—*Gloſſo-ſtaphilinus.*—This muſcle ariſes from the very root of the tongue on each ſide, goes round the middle of the velum, and ends in the *uvula*. This ſemicircle forms the firſt arch which preſents itſelf when looking into the mouth. Its office is to pull down the ſoft palate, and raiſe the root of the tongue at the ſame time.

PALATO-PHARYNGEUS.—*Salpingo-pharyngeus.*—Ariſes in the middle of the ſoft palate, goes round the entry of the fauces, forming the ſecond arch in the mouth, and ends in the edge of the thyroid cartilage. It aſſiſts in contracting the arch of the fauces.

AZYGOS UVULÆ *.—A ſlip of ſtraight fibres which goes directly down from the peak of the palate bones to the uvula, which its pulls directly upwards.

MUSCLES SITUATED ON THE SUPERIOR PART OF THE PHARYNX.

CONSTRICTOR PHARYNGIS INFERIOR.—Ariſes partly from the thyroid, and partly from the cricoid cartilage, and meets its fellow in a tendinous middle line. It aſſiſts in puſhing down the morſel through the pharynx.

CONSTRICTOR PHARYNGIS MEDIUS.—Ariſes from the round point of the os hyoides and its cartilage, and is inſerted into the ambit of the pharynx, its uppermoſt part touching the occipital bone. It compreſſes the pharynx, and at the ſame time draws the hyoid bone upwards.

CONSTRICTOR PHARYNGIS SUPERIOR.—Ariſes from the baſis of the cranium, from the jaws, palate, and root of the tongue, and ſurrounds, with its fellow, the upper part of the pharynx, which it moves upwards and forwards, and alſo compreſſes.

MUSCLES SITUATED ABOUT THE GLOTTIS.

CRICO-ARYTÆNOIDEUS POSTICUS.—A ſmall pyramidal muſcle, which ariſes broad from the back part of the cricoid cartilage,

tilage, and goes directly upwards to be inſerted by a narrow point into the back of the arytænoid cartilage. This pair of muſcles pulls the arytænoid cartilage directly backwards, and lengthens the *rima glottidis.*

CRICO-ARYTÆNOIDEUS OBLIQUUS.—*Crico-arytænoideus lateralis.*—Ariſes from the ſide of the cricoid cartilage, and goes obliquely to be inſerted into the ſide of the arytænoid. It opens the glottis.

THYREO-ARYTÆNOIDEUS.—Ariſes from the back of the wing of the thyroid cartilage, from the hollow, and is inſerted into the fore part of the arytænoid cartilage. It widens the glottis by pulling the arytænoid cartilage forward.

ARYTÆNOIDEUS OBLIQUUS.—Theſe delicate muſcles ariſe from the root of each arytænoid cartilage, and go obliquely upwards to the points of the oppoſite one. They draw the cartilages together, and cloſe the glottis.

ARYTÆNOIDEUS TRANSVERSUS*.—A delicate muſcle which ariſes from the whole length of one arytænoid cartilage, and goes acroſs to be implanted into the whole length of the oppoſite one. By drawing theſe cartilages together the glottis is contracted.

THYREO-EPIGLOTTIDEUS.—Ariſes from the thyroid cartilage, and is inſerted into the ſide of the epiglottis. It pulls the epiglottis obliquely downwards.

ARYTÆNO-EPIGLOTTIDEUS.—This muſcle ariſes from the upper part of the arytænoid cartilage laterally, and is inſerted into the ſide of the epiglottis, which it moves outwards.

MUSCLES SITUATED ON THE ANTERIOR PART OF THE ABDOMEN.

OBLIQUUS EXTERNUS.—*Obliquus externus deſcendens. Obliquus major deſcendens. Declivis.*—This muſcle, which is the outermoſt of all the abdominal muſcles, ariſes by diſtinct fleſhy tongues, from the eight lower ribs. Its fibres paſs down all in one parallel direction with each other, but oblique with reſpect to the abdomen. Its fleſhy belly ceaſes about the middle of the ſide, and becomes a flat tendon, which goes over the fore part of the belly, until it meets its fellow in the middle. This meeting of the tendons, along with that of the other muſcles to be deſcribed, forms a white line extending from the pubis to the ſternum, called *linea alba*. Before the tendon of this muſcle reaches the middle of the belly it unites with the flat tendon of the inner oblique muſcle, about four inches on either ſide of the *linea alba*, and forms a ſemilunar white line, called *linea ſemilunaris*. Beſides the inſertion of this muſcle into the linea alba, it is implanted into the ſpine of the ilium, and the ligament, which extends from the ſpine of the ilium to the creſt of the pubis, called Poupart's ligament. It compreſſes the abdomen; hence its utility is very conſiderable in expiration, evacuation of the fæces, urine, fœtus, &c.

The operation for removing the water in abdominal aſcites is now performed in the linea alba, in the middle between the pubis and umbilicus, care being taken to cauſe the urine to be evacuated previous to it.

OBLIQUUS INTERNUS.—*Obliquus internus aſcendens*. *Obliquus minor*.—This muſcle ariſes fleſhy from all the circle of the ſpine of the ilium; and by a thin tendon, common with the *ſerratus* and *latiſſimus dorſi*, from the three lower ſpinous proceſſes of the loins. From the ſpine of the ilium it aſcends upwards in a radiated direction, and croſſes the abdomen to the linea alba; its higher fibres reaching the ſternum, and the lower ones the pubis. Its flat tendon is inſerted into the cartilages of all the falſe ribs, into the ſternum, and into the linea alba, throughout its whole length. It acts in conjunction with the former.

Transversalis abdominis.—This muſcle ariſes, fleſhy from the inner ſurface of the ſix lower ribs; from the tranſverſe proceſſes of the four laſt lumbar vertebræ; from the whole ſpine of the ilium, and from part of Poupart's ligament. Its fibres run directly acroſs the abdomen, and are inſerted tendinous into the whole length of the *linea alba*. This muſcle alſo acts in conjunction with the two former in compreſſing the abdomen.

Rectus abdominis.—Theſe two muſcles cover the fore part of the abdomen, in a line between the ſternum and pubis, one on each ſide the linea alba, and are encloſed all this way by a ſheath of tendon, formed by a ſeparation of thoſe of the oblique, which are uppermoſt, from that of the tranſverſalis, which lies underneath. The origin is fleſhy from the outſide of the ſternum; it proceeds about four inches in breadth all down the abdomen, and is inſerted by a ſhort flat-pointed tendon on the ſide of the ſymphyſis of the pubis. It is croſſed at intervals by four tendinous interſections. The recti muſcles not only compreſs the abdomen, but bring the trunk forwards towards the pubis.

Pyramidalis.—A ſmall triangular muſcle immediately above the ſymphyſis pubis, from the ſide of which it ariſes broad, and is inſerted a little above into the linea alba. Its uſe is to aſſiſt the rectus in drawing down the ſternum, and alſo to tighten the linea alba.

The *umbilicus*, or navel, was originally an opening in the fœtus, through which the umbilical vein and two umbilical arteries paſſed. After birth the veſſels degenerate into ligaments within the abdomen, and the opening is cloſed, like a ring, in the middle of the *linea alba*. The tendinous fibres are very firmly connected together in this place; yet they occaſionally give way, and furniſh an outlet to the abdominal viſcera: this conſtitutes an umbilical hernia.

The *abdominal ring*, or, as it is alſo termed, the inguinal ring, is an opening in the lower part of the abdomen, juſt above the pubis, through which the ſpermatic cord of men paſſes, and the round ligament of women. It is an opening in the external oblique muſcle only, the other muſcles having nothing to do with it; formed by the ſplitting, as it were, of its tendinous fibres at that part. It begins about an inch and a half above the pubis, is oblique, looking towards the pubis. The tendinous fibres forming the upper part of the opening go directly towards the higheſt point of the pubis; and the ſlip of fibres which form the lower edge of the ſlit turn in behind the upper one, and are implanted into the pubis, within and behind the upper edge of fibres. It is this croſſing of the fibres which ſecures the opening; for the more the muſcle pulls in preſſing the abdomen, the tighter the ring is drawn. Protruſions of the viſcera of the abdomen at this place form bubonocele.

Umbilical and inguinal *herniæ* do not conſiſt in the rupture of any part to allow the viſcera to protrude. The tendinous fibres loſe their ſtrength, and conſtant preſſure upon them cauſes them to be elongated, or to ſeparate from one another: when this ſeparation is effected, the peritoneum lining the abdomen, an elaſtic membrane, always goes before the protruding viſcus, and conſtitutes the *ſac* of the hernia. Original malformation of the inguinal ring is the moſt frequent cauſe of hernia in that part: this runs through families.

The operation to relieve *ſtrangulated herniæ* in theſe parts conſiſts in cutting down upon the ſtrangulated viſcus to examine it, and then enlarging the opening which ſtrangulated it, ſo as to allow of its being returned.

Hydrocele of the hernial ſac is a very common diſeaſe. It frequently accompanies an aſcites, when there is an inguinal hernia, and conſiſts merely of a collection of water in the peritoneum forming the ſac. It is removed on returning the fluid, by preſſure, into the cavity of the abdomen.

MUSCLES

MUSCLES ABOUT THE MALE ORGANS OF GENERATION.

DARTOS *.—The membrane ſo termed is ſaid by many to be muſcular; it appears, however, to be no more than a condenſation of cellular membrane lining the ſcrotum, which admits of being corrugated and relaxed. It is placed immediately under the ſkin of the ſcrotum.

CREMASTER.—A number of fleſhy fibres which ariſe about the ring and Poupart's ligament, and run downwards to be inſerted into the *tunica vaginalis teſtis.* When this flat ſheet of fibres contract, the teſticle is drawn upwards.

ERECTOR PENIS.—*Collateralis penis. Iſchio-cavernoſus.*—A ſmall muſcle which lies along the crus penis on each ſide. It ariſes by a ſlender tendon from the tuberoſity of the iſchium, and goes fleſhy, thin, and flat over the crus penis to be inſerted about two inches up into the crus of the penis. Theſe muſcles are ſuppoſed, by preſſing the penis againſt this pubis, to compreſs the *vena magna ipſius penis*, and ſo cauſe an erection.

ACCELERATOR URINÆ.—*Ejaculator ſeminis.*—Ariſes from the ſphincter of the anus, and a little above the bulb of the urethra, and meets its fellow in a white tendinous line along the lower part of the bulb of the urethra; ſo that theſe two muſcles ſurround the whole of the bulb. Their uſe is to compreſs the urethra in emptying it of the laſt drops of urine, and to expel forcibly the ſemen, which they do with a kind of involuntary or convulſive action.

TRANSVERSALIS PERINÆI.—*Tranſverſalis penis. Tranſverſalis perinæi alter.*—Ariſes by a delicate tendon from the tuberoſity of the iſchium, and croſſes the perinæum to be inſerted into the very back part of the bulb of the urethra. There is occaſionally another muſcle accompanying it, called *tranſver-*

ſalis perinæi alter. Its chief uſe is to prevent the anus being too much protruded in diſcharging the fæces.

MUSCLES OF THE ANUS.

SPHINCTER ANI*.—A broad circular band of muſcular fibres ſurrounding the anus. It ariſes from a point of the os coccygis behind; ſends a neat ſlip forwards, by which it is attached to the back part of the *accelerator urinæ*. When it contracts, the anus is ſhut.

In performing the operation for *fiſtula in ano*, this muſcle, or ſome part of it, is moſtly divided.

LEVATOR ANI*.—*Muſculus ani latus.*—One broad thin muſcle ariſing from the internal ſurface of the fore part of the pelvis; ſo that its origin is continued from the internal pubis all the way round to the ſacrum. It grows gradually ſmaller as it goes downwards to ſurround the anus, and is inſerted into the circle of the anus, the point of the os coccygis, and is mixed with the *ſphincter ani.* This muſcle raiſes the anus, and dilates it, and ſupports it during the evacuation of the fæces.

MUSCLES OF THE FEMALE ORGANS OF GENERATION.

ERECTOR CLITORIDIS.—A ſmall delicate muſcle ariſing from the internal part of the crus of the iſchium, and inſerted into the upper part of the crus, and into the body of the clitoris. Its uſe is to draw the clitoris downwards, and make it tenſe.

SPHINCTER VAGINÆ*.—A circular bundle of fibres ariſing from the ſphincter ani and ſides of the vagina, which it ſurrounds, ſounds, and inſerted into the union of the *crura clitoridis.* It contracts the entrance of the vagina.

MUSCLES SITUATED WITHIN THE PELVIS.

OBTURATOR INTERNUS.—*Marſupialis. Burſalis.*—This muſcle ariſes from all the internal ſurface of the obturator ligament, from the edges of the foramen thyroideum within the pelvis, and comes out by turning round the iſchium in the notch between the tuberoſity and the ſpine of the ilium; it proceeds between the crura of the gemini and its tendon, is united to theirs, and inſerted with them by one common tendon into the root of the great trochanter. It rolls the thigh obliquely outwards.

COCCYGEUS.—A thin flat muſcle which ariſes by a narrow point from the inſide of the ſpinous proceſs of the ilium, and is inſerted, after being expanded, fleſhy into the whole length of the os coccygis. It pulls the point of the os coccygis upwards.

MUSCLES SITUATED WITHIN THE CAVITY OF THE ABDOMEN.

DIAPHRAGMA*.—*Septum tranſverſum.*—The diaphragm is called, in Engliſh, midriff. It is a tranſverſe vaulted muſcle, dividing the cavity of the thorax from that of the abdomen. It is fleſhy towards its borders, and tendinous in the centre, convex towards the thorax, concave towards the abdomen. It ariſes by one broad fleſhy attachment from all the lower borders of the cheſt; and this fleſhy origin conſtitutes what is conſidered by ſome as the upper or *greater muſcle* of the diaphragm. It ariſes alſo by many ſmall tendinous feet from the fore part of the loins, which ſoon unite in two fleſhy bellies, termed the *crura diaphragmatis*, which, meeting, form what is termed the *leſſer muſcle* of the diaphragm. The middle of the diaphragm is a ſtrong aponeuroſis, and is diſtinguiſhed by the epithet of *centrum tendinoſum*. The ſhape of this tendinous centre is determined by the fleſhy bellies; the large one above almoſt ſurrounds it, and the leſſer one below meeting the larger, the two diviſions give it a pointed form behind, not unlike a trefoil leaf, or the ace of hearts. The tendinous centre is fixed to the ſpine, ſo that the two ſides form two convexities in the cavity of the cheſt.

Apertures. This great muſcle is perforated by ſeveral veſſels paſſing reciprocally betwixt the thorax and abdomen; and the apertures through which they paſs have received appropriate names:—1. *Foramen dextrum*. The vena cava paſſes through this foramen to the heart. The opening is of a triangular ſhape, tendinous, and larger than the vein requires, ſo that there is no danger of ſtrangulation.—2. The *foramen ſiniſtrum*, which is in the lower fleſhy belly; it tranſmits the œſophagus and par vagum into the cavity of the abdomen, and the muſcular fibres are ſo diſpoſed as to make ſome anatomiſts believe they acted as a ſphincter to the cardia.—3. The *foramen poſterius*, which is formed by the crura of the diaphragm beſtriding it like an arch, to defend it from preſſure. The aorta paſſes through this opening into the abdomen, and the thoracic duct and *vena azygos* from the cavity of the abdomen into the thorax.

Coverings. The upper ſurface of the diaphragm is covered by the pleura, and its under ſurface by the peritoneum.

Arteries. The diaphragmatic arteries ariſe from the deſcending aorta.

Veins. The veins follow the arboreſcent courſe of the arteries, and empty their blood into the vena azygos.

Nerves. The nerves of the diaphragm are called *phrenic*, it being formerly the ſuppoſed ſeat of the mind: they ariſe from the ſpinal nerves of the neck.

Uſe. Next to the heart, this muſcle is the moſt uſeful; it is the principal muſcle in reſpiration, and is ſo perfect in this office, that though there be a complete anchyloſis of the ribs, the perſon lives and breathes by the diaphragm, without feeling the loſs. Its actions, in aſſiſting thoſe of the abdominal muſcles in agitating the bowels, expelling the fæces, urine, and fœtus during labour, are of the utmoſt aſſiſtance.

Inflammation of the diaphragm conſtitutes the diſeaſe called *paraphrenitis*, or *diaphragmitis*. It is ſometimes an idiopathic affection, but more frequently a ſymptomatic one.

The appearances, after death, of the *true paraphrenitis* are, a high ſtate of inflammation of the muſcular ſubſtance of the diaphragm, which is of a very black colour and ſoft, as if gangrene had taken place. The *ſpurious diaphragmitis* ariſes from inflammation of the pleura or peritoneum; and is therefore treated of under the diſeaſes of the pleura and peritoneum.

A portion of the diaphragm has been converted into cartilage, which had become completely oſſified in its centre; but whether this was originally a diſeaſe of the pleura, or peritoneum, or diaphragm, is not eaſily determined.

Quadratus lumborum.—A flat, oblong, though ſomewhat ſquare, muſcle, ariſing fleſhy from the back part of the os ilium and ligaments of the pelvis, which tie the back part of the ilium to the ſide of the ſacrum and tranſverſe proceſſes of the lumbar vertebræ. It goes upwards to be inſerted into the points of the tranſverſe proceſſes and the lower edge of the laſt rib. It ſupports the loins, and draws the ſpine to one ſide.

PSOAS PARVUS.—A muſcle of the loins which ariſes from the laſt dorſal and firſt lumbar vertebræ, and paſſes down by the ſide of the pſoas magnus to be inſerted into the brim of the pelvis, near the acetabulum. It is often wanting. It bends the loins forwards.

PSOAS MAGNUS.—A very long and fleſhy muſcle filling the ſpace upon the ſides of the ſpine. It ariſes by an upper head from the laſt vertebra of the back, then ſucceſſively from each lumbar vertebra, not only from the ſides of their bodies, but likewiſe from their tranſverſe proceſſes. The muſcle then deſcends thick, round, and fleſhy, to be united with the internal iliac muſcle, under Poupart's ligament, and the common tendon then bends obliquely round to be inſerted into the leſſer trochanter. The pſoas muſcles are in conſtant uſe in moving the thigh forwards, and ſupporting the pelvis upon the thigh bone.

Inflammation of the cellular membrane near this muſcle very frequently terminates in abſceſs, called *pſoas abſceſs.* Diſſections prove that it more commonly happens in the cellular ſtructure around the muſcle than in the muſcle. After a ſhort time, the pus deſcends under Poupart's ligament, following the courſe of this muſcle in the cellular ſubſtance ſurrounding the tendon and femoral veſſels. At other times it inſinuates itſelf under the faſcia of the thigh, and opens in various places very remote from the pſoas muſcle. Nor is its appearance upon the loins and about the hip joint unfrequent. It moſtly proves fatal.

ILIACUS INTERNUS.—A thick, fleſhy, fan-like muſcle, occupying the internal ſurface of the iliac portion of the os innominatum. It ariſes from the inner edge of the criſta of the ilium, and adheres to the concavity of that bone down to the brim of the pelvis, to the fore part of the bone under the ſpinous proceſs. All its radiated fibres are gathered together into a tendon under Poupart's ligament, where it unites with the pſoas, and the common tendon turns obliquely round to be inſerted into the leſſer trochanter. It acts in conjunction with the pſoas in moving the thigh forwards.

MUSCLES SITUATED ON THE ANTERIOR PART OF THE THORAX.

Pectoralis major. — A large, thick, and fleſhy muſcle which covers all the breaſt. It ariſes from the clavicle next the ſternum, from the edge of the ſternum and the cartilaginous endings of the fifth and ſixth ribs. All its fibres converge to form a flat twiſted tendon, which goes before the arm-pit to be inſerted into the edge of the groove in the humerus for the tendon of the biceps. When this muſcle contracts, the arm is brought forwards obliquely.

> Cancer of the breaſt is ſituated over this muſcle; and is occaſionally very firmly attached to it.

Subclavius. — *Subclavianus.* — A ſmall muſcle concealed under the clavicle. It ariſes by a flat tendon from the cartilage of the firſt rib, and is inſerted fleſhy into a great part of the clavicle. Its uſe is to fix the clavicle more firmly.

Pectoralis minor.—*Serratus minor anticus.*—This muſcle lies underneath the pectoralis major, cloſe upon the ribs. It ariſes thick and fleſhy from the third, fourth, and fifth ribs, and its fibres all converge to form a thick fleſhy point, to be inſerted into the very apex of the coracoid proceſs of the ſcapula. It pulls the ſcapula directly forwards.

Serratus major anticus.—This muſcle covers the ſide of the cheſt. It ariſes by ſharp-pointed ſlips or digitations from all the true ribs, except the firſt, and from three of the falſe ribs. It proceeds upwards and backwards to form a fleſhy cuſhion, as it were, for the ſcapula; and its fibres all converge to be inſerted into the baſis of the ſcapula. It pulls the ſcapula downwards and forwards.

MUSCLES SITUATED BETWEEN THE RIBS, AND WITHIN THE THORAX.

Intercostales externi.—The external layer of muſcular fibres between the ribs is ſo termed. They run from the ſpine towards the ſternum, having their fibres directed from behind forwards, and ſtopping at the cartilages of the ribs. They aſſiſt in inſpiration, by raiſing the ribs.

Intercostales interni.—Theſe muſcles run from before backwards, underneath the former, and croſſing them. They raiſe the ribs.

Sterno-costalis.—*Triangularis ſterni.*—This is very generally conſidered as a triangular muſcle lying on each ſide, chiefly on the inner face of the ſternum, and on the cartilages of the ribs; whilſt ſome think it is three or four muſcles:—they are, in fact, three or four ſlips, ariſing from the enſiform cartilage, and going over the middle of the ſternum to be inſerted into the ſecond, third, and fourth rib. Their office is to depreſs the rib.

MUSCLES SITUATED ON THE ANTERIOR PART OF THE NECK CLOSE TO THE VERTEBRÆ.

Longus colli.—This is the chief of the muſcles which lie on the fore part of the neck. It ariſes, within the thorax, from the flat part of the bodies of the three uppermoſt dorſal vertebræ, and from the tranſverſe proceſſes of the four laſt vertebræ of the neck; and is inſerted into the fore part of the ſecond cervical vertebra, where the oppoſite large muſcles meet. It pulls the neck to one ſide, and, with its fellow, the head and neck directly forwards.

RECTUS INTERNUS CAPITIS MAJOR.—Ariſes from the tranſverſe proceſſes of the five lower cervical vertebræ, and proceeds obliquely to be inſerted into the cuneiform proceſs of the occipital bone, juſt before the *foramen magnum occipitale*. It pulls the head and neck directly forwards.

RECTUS INTERNUS CAPITIS MINOR.—A very ſmall muſcle immediately underneath the former. It ariſes from the fore part of the atlas, and goes obliquely inwards to be inſerted into the occipital bone, near the condyle. It aſſiſts the former.

RECTUS CAPITIS LATERALIS.—A very ſmall muſcle like the former. It ariſes from the tranſverſe proceſſes of the atlas, and is inſerted into the ſide of the cuneiform proceſſes of the os occipitis. It lies immediately under the exit of the internal jugular vein. It moves the head to one ſide; and, when both act, they aſſiſt the former muſcles in pulling the head forwards.

MUSCLES SITUATED ON THE POSTERIOR PART OF THE TRUNK.

TRAPEZIUS.—*Cucullaris*.—Theſe two muſcles cover the back part of the neck and ſhoulders, extending from the tip of one ſhoulder to the tip of the other, and from the nape of the neck quite down to the loins; hence it has been compared to a monk's cowl hanging back upon the neck. It ariſes by a ſtrong tendon from the moſt pointed part of the os occipitis, and along the tranſverſe ſpine to the maſtoid proceſs: from this point, all down the neck, it has no hold of the vertebræ, but ariſes from the *ligamentum nuchæ*; it then ariſes from the ſpines of the two laſt cervical vertebræ, and thoſe of the back. From this long origin its fibres converge into one point, the tip of the ſhoulder, to be inſerted into the ſcapular end of the clavicle, the acromion of the ſcapula, and the whole length of its ſpine. The trapezius is chiefly a muſcle of the ſcapula; it alſo bends the neck and head backwards.

Latissimus dorsi.—The broadeſt muſcle of the whole body. It covers all the lower part of the back and loins. It ariſes by a broad flat tendon in the middle of the back, loins, and ſacrum, and fleſhy from the circle of the ilium. The tendon gradually becomes a flat regular muſcle, which proceeds upwards, paſſes over the corner of the ſcapula, from which it receives a ſmall fleſhy bundle, and ſeveral ſmaller ones as it paſſes over the ribs; it then becomes a twiſted tendon, which, paſſing into the axilla, turns under the os humeri to be inſerted into the inner edge of the groove of the tendon of the biceps. Thus it appears that the anterior part of the axilla is formed by the *pectoralis major*, and the poſterior by the *latiſſimus dorſi:* hence they ſupport the whole body when on crutches. The latter muſcle brings the arm down, when raiſed, as in ſtriking with the hammer; and downwards and backwards, as in knocking with the elbow; it alſo turns the palm of the hand behind the back.

Serratus posticus inferior.—A very broad thin muſcle, ſituated in the lower part of the back, under the former, with which it ariſes from the three lower dorſal and four uppermoſt lumbar vertebræ. It ſoon becomes fleſhy, and divides into three or four ſlips, each of which is inſerted ſeparately into the ninth, tenth, eleventh, and twelfth lower ribs, near their cartilage. It pulls the ribs downwards and backwards.

Rhomboideus.—*Rhomboideus major et minor.*—A neat, flat, ſquare muſcle, ſituated between the ſpine and the whole length of the baſis of the ſcapula. One part ariſes from the three lower ſpinous proceſſes of the cervical vertebræ, and goes acroſs to be inſerted into the uppermoſt part of the baſis of the ſcapula. The other portion ariſes from the ſpinous proceſſes of the four firſt dorſal vertebræ, and goes directly acroſs under the former piece to be implanted into the lowermoſt part of the baſis of the ſcapula. Theſe are generally conſidered as two diſtinct muſcles, though it often happens that there is no diviſion, and moſt frequently only a partial one. The uſe of the rhomboideus is to move the ſcapula upwards and backwards.

SPLENIUS.—*Splenius capitis*. *Splenius colli*.—This muſcle lies immediately under the *trapezius* and above the *complexus*, and is named *ſplenius*, from its lying like a ſurgical ſplint along the ſide of the neck. It is a flat and broad muſcle ariſing from the four uppermoſt ſpinous proceſſes of the back and five loweſt of the neck, and proceeds upwards and outwards to be implanted into the whole length of the occipital ridge and maſtoid proceſs of the temporal bone. Immediately under this portion is another ariſing with it, but terminating by four or five diſtinct tendons in the tranſverſe proceſſes of the upper cervical vertebræ. This portion is conſidered by ſome as a diſtinct muſcle, and called *ſplenius colli*, and the former *ſplenius capitis*. When the muſcle of one ſide acts, the head is pulled backwards to one ſide; when both act, it is drawn directly backwards; and when the muſcle of one ſide with the *ſterno-cleido-maſtoideus* of the ſame ſide act together, the ear is brought down upon the ſhoulder.

SERRATUS SUPERIOR POSTICUS.—This is a flat muſcle lying on the poſterior part of the cheſt, over the ſplenius. It ariſes by a flat and ſhining tendon from the ſpinous proceſſes of the lower cervical and two uppermoſt dorſal vertebræ, and goes obliquely downwards under the upper corner of the ſcapula to be inſerted into the ſecond, third, and fourth ribs, by three fleſhy digitations. They elevate the ribs.

SPINALIS DORSI.—There is one long maſs of muſcular and tendinous fibres going from ſpine to ſpine along the whole length of the back and neck; and which is divided into *ſpinalis dorſi* and *cervicis*. The former ariſes from the two upper ſpinous proceſſes of the loins and three lower of the back, and paſſing two ſpines untouched, is inſerted into all the ſpinous proceſſes of the back, except the uppermoſt. It raiſes the ſpine.

LEVATORES COSTARUM.—*Supra-coſtales. Levatores coſtarum longiores.*—Theſe are twelve muſcles on each ſide, for the direct purpoſe of raiſing the ribs. They ariſe from the tranſverſe proceſſes of the laſt cervical and eleven uppermoſt dorſal vertebræ, and go down to the angle of each rib. The three laſt are twice as long as the others.

SACRO-LUMBALIS.—*Additamentum ad ſacro-lumbalem. Muſculi acceſſorii.*—This muſcle ariſes by a tendon common to it and the *longiſſimus dorſi*, from all the ſpinous proceſſes of the lumbar vertebræ, from the ſpines of the ſacrum, and back part of the os ilium. Juſt oppoſite the loweſt rib the tendons ſeparate, and the ſacro-lumbalis goes away to be inſerted by a flat tendon into each rib. From the ſurface of the ſix or ſeven loweſt ribs there ariſes a ſmall ſlip, which mixes with the ſubſtance of this muſcle, and are termed *additamentum ad ſacro-lumbalem*, and ſometimes *muſculi acceſſorii*. There is alſo a fleſhy ſlip connected with the ſacro-lumbalis, ſometimes deſcribed as a diſtinct muſcle, when it is termed cervicalis deſcendens.

CERVICALIS DESCENDENS.—This muſcle is connected with the former; it ariſes from the tranſverſe proceſſes of the five lower cervical vertebræ, and paſſes downwards ſmall and ſlender to be inſerted into the ſix uppermoſt ribs. It turns the neck obliquely backwards, and to one ſide.

LONGISSIMUS DORSI.—A round, thick, firm muſcle, filling up the hollow betwixt the ſpine and the angle of the ribs. It ariſes by a tendon common to it and the former muſcle, and is implanted by two diſtinct ſets of inſertions into the heads of the ribs and the tranſverſe proceſſes of the vertebræ. The chief uſe of this muſcle is to aſſiſt in returning the ſpine to the erect poſture, and to keep it erect.

Transversalis colli.—Ariſes from the five upper tranſverſe proceſſes of the dorſal vertebræ, and paſſes upwards to be inſerted into the tranſverſe proceſſes of the neck. It is ſometimes conſidered as belonging to the longiſſimus dorſi.

Complexus.—*Implicatus. Trigeminus. Biventer cervicis. Complexus major.*—This is ſo called from the intricacy of its muſcular and tendinous parts. It lies immediately under the ſplenius, and ariſes by ten or more tendinous feet from the tranſverſe proceſſes of the four lower cervical and ſeven uppermoſt dorſal vertebræ. It then becomes a large, thick, fleſhy, and tendinous maſs, filling up the hollow by the ſides of the cervical ſpinous proceſſes, and terminates by a broad fleſhy head in the lower occipital ridge. It draws the head backwards.

Trachelo-mastoideus.—*Complexus minor. Maſtoideus lateralis.*—Ariſes from the tranſverſe proceſſes of the three firſt vertebræ of the back and the five loweſt of the neck, and is inſerted into the maſtoid proceſs. When one muſcle contracts, the head is drawn obliquely backwards; and when both act together, it is pulled directly backwards.

Levator scapulæ.—*Levator proprius angularis. Muſculus patientiæ.*—A ſmall thin muſcle which ariſes from the tranſverſe proceſſes of the four or five uppermoſt vertebræ of the neck, by as many diſtinct heads, which ſoon unite, and the muſcle goes downwards to be inſerted into the upper part of the ſcapula by a thin tendon. It pulls the ſcapula up, as in ſhrugging the ſhoulders.

SEMI-SPINALIS DORSI.—*Tranſverſo-ſpinalis dorſi.*—Ariſes from the tranſverſe proceſſes of the ſeventh, eighth, ninth, and tenth dorſal; and is inſerted into the ſpinous proceſſes of the four uppermoſt and laſt cervical vertebræ. It extends the ſpine obliquely backwards.

MULTIFIDUS SPINÆ.—*Semi-ſpinalis internus,* ſive *tranſverſo-ſpinalis dorſi. Semi-ſpinalis,* ſive *tranſverſo-ſpinalis colli, pars interna. Tranſverſalis lumborum,* vulgo *ſacer. Tranſverſalis dorſi. Tranſverſalis colli.*—The many irregular portions of muſcle, which authors have variouſly deſcribed, running from the ſacrum all along the ſpine to the vertebræ of the neck, are comprehended under the name of *multifidus ſpinæ.* It begins tendinous and fleſhy from the upper part of the ſacrum, from the oblique proceſſes of the lumbar vertebræ, from the tranſverſe proceſſes, and from the oblique proceſſes of the cervical vertebræ; and its many bundles are inſerted into the ſpinous proceſſes of the third or fourth, above that from which the bundle aroſe. Theſe muſcles prevent the ſpine from being too much bent forwards, and alſo move the ſpine backwards.

SPINALIS CERVICIS.—*Semi-ſpinalis colli. Tranſverſo-ſpinalis colli.*—Ariſes from the tranſverſe proceſſes of the ſix uppermoſt dorſal vertebræ, and is inſerted into all the ſpinous proceſſes of the cervical vertebræ, except the firſt and laſt. It ſtretches the neck obliquely backwards.

RECTUS CAPITIS POSTICUS MAJOR.—Ariſes tendinous from the tranſverſe proceſs of the ſecond cervical vertebra, and mounts up fleſhy to be inſerted into the lower occipital ridge. It draws the head backwards.

RECTUS CAPITIS POSTICUS MINOR.—A ſhorter muſcle than the former, ariſing tendinous from the middle of the firſt vertebra of the neck, and is inſerted fleſhy with the former into the lower occipital ridge. Its action aſſiſts that of the major.

Obliquus capitis superior.—The oblique muſcles very much reſemble the recti, except in their direction. This ariſes from the tranſverſe proceſs of the atlas, and goes obliquely to be inſerted into the end of the lower occipital ridge. It aſſiſts in turning the head.

Obliquus capitis inferior.—Ariſes from the ſpinous proceſs of the ſecond cervical vertebra, and is inſerted into the tranſverſe proceſs of the atlas. It aſſiſts in turning the head quickly.

Scalenus.—*Scalenus, primus et ſecundus.*—The ancients conſidered this as one triangular muſcle. It has ſince been diſtinguiſhed as two, three, four, and even five diſtinct muſcles. It is, in fact, one great, flat, triangular muſcle, ſtretching from the ribs to the neck, cloſing the thorax above, and giving paſſage to the nerves and veſſels of the arm. It ariſes from the tranſverſe proceſſes of the ſix lower cervical vertebræ: one part of it is inſerted into the flat part of the firſt rib cloſe by its cartilage, another portion is inſerted into the whole length of the outer edge of the firſt rib, and a third portion is inſerted into the upper edge of the rib. It moves the head forwards, or pulls the neck to one ſide.

Interspinales.—*Interſpinales colli, dorſi, et lumborum.*—Under this term are comprehended the muſcular, tendinous, and ligamentous fibres paſſing from one ſpinous proceſs to the next throughout the ſpine. In the neck they are muſcular; in the back, ligamentous; and in the loins, tendinous, or ligamentous. They draw the ſpinous proceſſes towards each other.

Inter-transversales.—Theſe are ſmall bundles, ſtrongeſt where there is moſt motion, paſſing between the tranſverſe proceſſes of the ſpine. They draw theſe parts together.

MUSCLES OF THE SUPERIOR EXTREMITIES.

Supra-spinatus.—A muſcle occupying the hollow of the ſcapula above its ſpine. It ariſes from the back, ſpine, and edge of the ſcapula, is very thick and fleſhy, and is encloſed by an aponeuroſis. It runs along the ſcapula under the acromion, and there becomes tendon, which paſſes over the head of the humerus, to be inſerted into the great tuberoſity of the head of the humerus. It raiſes the arm directly upwards.

Infra-spinatus.—This ariſes from the back, ſpine, and lower margin of the ſcapula, occupying the cavity below the ſpine of the ſcapula, and is covered with a ſtrong aponeuroſis like the former muſcle. It becomes perfectly tendinous at the capſular ligament of the ſhoulder joint, to which it is attached, and then paſſes over it to be inſerted into the great tuberoſity of the humerus. It aſſiſts the former.

Teres minor.—A flat muſcle, which appears ſomewhat round when ſuperficially diſſected. It is cloſely connected at its origin with the infra-ſpinatus; it is long, ſmall, and fleſhy, and ariſes from the angle and all the lower edge of the ſcapula, and accompanies the infra-ſpinatus to be attached to the capſular ligament, and then inſerted into the great tuberoſity of of the os brachii. It aſſiſts the former muſcles in raiſing the arm.

Teres major.—This is a thicker and longer muſcle than the former, ſituated below it, and ariſing chiefly from the angle of the ſcapula, and is cloſely connected with the teres minor and infra-ſpinatus. Its tendon paſſes under the long head of the triceps, and is inſerted into the ridge on the inner ſide of the groove along with the tendon of the latiſſimus dorſi. Its chief uſe is to draw the arm downwards and backwards.

Deltoides.—A thick fleſhy muſcle which covers the top of the ſhoulder. It ariſes from the outer end of the clavicle; from the point of the acromion of the ſcapula, and alſo from the ſpine of the ſcapula; the muſcular fibres from theſe origins all converge over the ſhoulder, and form a flat ſtrong tendon, which is inſerted into the os brachii, one third down. Its uſe is to raiſe the arm.

Coraco-brachialis.—*Muſculus perforatus Cafferii.*—A long and rather ſlender muſcle, ſo named from its origin and inſertion. It ariſes fleſhy from the coracoid proceſs of the ſcapula, along with the ſhort head of the biceps, which it accompanies, and is inſerted by a ſhort tendon into the middle of the *os brachii.* It raiſes the arm obliquely forwards and upwards.

Subscapularis.—This muſcle lines all the convexity of the ſcapula, and is conſequently of a triangular ſhape. It is very fleſhy, thick, and ſtrong, and its fibres all converging from their origin in the two edges and baſe of the ſcapula, to form a tendon, give it a radiated or fan-like appearance. The tendon accompanies that of the ſupra-ſpinatus, and goes round the head of the humerus to be inſerted into the leſſer tuberoſity of the os brachii. It rolls the arm inwards.

MUSCLES SITUATED ON THE OS BRACHII.

Biceps flexor cubiti.—*Biceps. Biceps flexor brachii.*—A very thick and ſtrong muſcle ſituated in the fore part of the arm. It ariſes by two diſtinct heads: one, the larger and thicker head, ariſes by a long tendon from the coracoid proceſs of the ſcapula; the other, the ſhorter head, ariſes from the edge of the glenoid cavity of the ſcapula. About one third down the arm the two heads meet, and form a firm fleſhy belly, which terminates in a tendon implanted into the tubercle on the fore part of the radius, a little below its neck.

An aponeuroſis is ſent off from this muſcle juſt above the flexure of the arm. It bends the fore-arm with great ſtrength.

> The aponeuroſis of the biceps is ſometimes punctured in bleeding. When the puncture is in the direction of the fibres, and the arm kept ſtill, it ſeldom produces any miſchief; but when the fibres are divided tranſverſely, and the muſcle put into much action, inflammation and its conſequences take place.

Brachialis internus.—This muſcle lies immediately under the biceps, which it aſſiſts. It ariſes by a forked head from two thirds of the os brachii at its fore part, and continues its attachment all the way down to within an inch of the joint. It is inſerted by a flat tendon into the coracoid proceſs of the ulna.

Triceps extensor cubiti.—*Extenſor longus. Extenſor brevis. Brachialis internus.*—This muſcle is ſituated on the back part of the arm, and was formerly deſcribed as three diſtinct muſcles. It ariſes by a long tendon from the edge of the ſcapula; by an outer head from the os brachii, juſt under the greater tuberoſity; and by an internal head, which is the ſhorteſt from the inſide of the os brachii, juſt under the inſertion of the teres major. All theſe heads unite and are continued downwards, adhering to the os brachii, to within an inch of the joint, where a ſtrong thick tendon is formed, which is implanted into the olecranon. It extends the fore-arm with conſiderable force.

Anconeus.—A ſmall triangular muſcle placed on the back part of the elbow. It ariſes from the external condyle of the os brachii, and is inſerted into the back part or ridge of the ulna. It aſſiſts in extending the fore-arm.

MUSCLES SITUATED ON THE FORE-ARM.

Supinator radii longus.—This muſcle forms the very edge of the fore-arm, ariſing from the edge above the external condyle of the os brachii, becomes very fleſhy as it paſſes the elbow joint, then tendinous and long, and is inſerted into the radius near the ſtyloid proceſs. It aſſiſts in turning the palm of the hand upwards.

Extensor carpi radialis longior.—Ariſes from the ridge of the os brachii juſt above the external condyle; having become a thick fleſhy belly, it paſſes along the back of the radius, and then forms a thin tendon, which paſſes over the wriſt under the annular ligament, and is inſerted into the root of the metacarpal bone of the fore-finger. It extends the wriſt.

Extensor carpi radialis brevior.—This muſcle is almoſt the ſame in origin and uſe with the former. It is inſerted into the fore part of the metacarpal bone of the middle finger.

Extensor digitorum communis.—This muſcle covers the middle of the back part of the fore-arm, and betwixt the extenſor radialis ſecundus and the extenſor minimi digiti. It ariſes from the outer condyle of the humerus; it grows very fleſhy and thick as it deſcends, and about the middle of the fore-arm divides into three ſlips. The tendons paſs under the annular ligament, along the metacarpal bones and firſt phalanx of the fingers, where they are joined by thoſe of the interoſſei and lumbricales, and form a tendinous ſheath, which ſurrounds the back of all the fingers. It extends the fingers.

Extensor minimi digiti.—*Auricularis.*—The little finger is raiſed by this muſcle, as in picking the ear. It ariſes from the outer condyle of the humerus, and accompanies the extenſor digitorum communis, paſſes under the annular ligament in a channel peculiar to it, and is inſerted into the ſecond joint of the little finger.

Extensor carpi ulnaris. — Ariſes from the external tubercle of the humerus, and proceeds along the ulnar edge of the arm to be affixed tendinous into the outſide of the lower head of the metacarpal bone of the little finger. Its uſe is to extend the carpus.

Flexor carpi ulnaris. — This muſcle ariſes tendinous from the inner condyle of the os humeri, and fleſhy from the olecranon; it proceeds fleſhy along the lower edge of the arm; about the middle it becomes tendon, which goes to be inſerted into the os piſiforme. The flexor carpi radialis with this muſcle bend the wriſt with great force; alone, it pulls the hand ſideways.

Palmaris longus.—A long thin muſcle that ariſes from the internal condyle of the os humeri; its fleſhy belly is but two or three inches long; it then forms a ſlender tendon, and paſſes along the middle of the fore-arm to be inſerted into the annular ligament, juſt under the root of the thumb. It expands from thence into an aponeuroſis, which covers and protects the muſcles and blood-veſſels of the hand. It bends the hand.

Flexor carpi radialis.— A long thin muſcle ariſing, by a thick, ſhort, and ſplit tendon, from the internal condyle of the humerus, from which it proceeds fleſhy along the middle of the fore-arm in the courſe of the radius. Its thin tendon paſſes under the annular ligament in a groove peculiar to itſelf, to be inſerted into the metacarpal bone of the fore-finger. It bends the wriſt.

Pronator radii teres. — A ſmall round muſcle which ariſes from the internal condyle of the humerus, and from the coronoid proceſs of the ulna. It is chiefly fleſhy, and of a conical ſhape, ſtretching obliquely acroſs the arm to be inſerted into the outer ridge of the radius, about the middle of its length. It turns the hand downwards.

SUPINATOR RADII BREVIS.—A ſhort, thick, and fleſhy muſcle: it ariſes from the external condyle of the os brachii, from the edge of the ulna, and from the interoſſeous ligament; and is turned over the radius to be inſerted into its ridge. It rotates the radius outwards.

EXTENSOR OSSIS METACARPI POLLICIS MANUS.—*Extenſor primus pollicis. Extenſor primi internodii. Abductor longus pollicis manus.*—This muſcle croſſes the fore edge of the radius; ariſing from the edge of the ulna, about the middle of the arm. Its fleſhy belly divides into two, three, or four ſlips, with diſtinct tendons, which go under the ligament of the carpus to be inſerted into the root of the firſt metacarpal bone of the thumb. Its uſe is to extend the thumb.

EXTENSOR PRIMI INTERNODII.—*Extenſor minor pollicis manus. Extenſor pollicis primus. Extenſor ſecundi internodii. Extenſor ſecundus pollicis.*—This muſcle lies cloſe to the former, ariſing juſt below it, and accompanying it under the ligament of the wriſt; it paſſes on to be inſerted into the firſt phalanx of the thumb, which it extends.

EXTENSOR SECUNDI INTERNODII.—*Extenſor major pollicis manus. Extenſor pollicis ſecundus. Extenſor tertii internodii. Extenſor tertius pollicis.*—A thick fleſhy muſcle, ariſing higher than the former on the ulna, and paſſing ſtraight down that bone. Its ſmall tendon paſſes the ligament of the wriſt in a peculiar ring, and goes on to be inſerted into the laſt bone of the thumb, which it extends.

INDICATOR.—*Extenſor indicis proprius.*—Ariſes from the ridge of the ulna, is attached to the interoſſeous ligament: its tendon paſſes under the annular ligament, and then joins with the indicator tendon of the common extenſor. It extends all the three joints of the fore-finger.

FLEXOR DIGITORUM SUBLIMIS.—*Perforatus.*—A large fleſhy muſcle which lies between the palmaris longus and flexor ulnaris; it ariſes from the internal condyle of the os brachii, from the ligament of the elbow joint, the coronoid proceſs of the ulna, and from the upper part of the radius. Its fleſhy and thick belly divides about the middle of the fore-arm into four fleſhy ſlips, each of which gives off a ſlender tendon, which paſſes under the annular ligament, to be inſerted, after being perforated near the firſt phalanx of the fingers by the tendons of the flexor digitorum profundus, into the fore part of the ſecond phalanx. The uſe of this ſtrong muſcle is to bend the firſt and ſecond phalanges.

FLEXOR DIGITORUM PROFUNDUS.—*Perforans.*—This muſcle lies deeper than the former, which it accompanies: it ariſes from the internal ſurface of the ulna, and the interoſſeous ligament; divides into four ſlips, whoſe tendons paſs under the annular ligament, perforate thoſe of the flexor ſublimis, and are inſerted into the fore part of the laſt phalanx of the fingers. It bends the laſt joint of the fingers.

FLEXOR LONGUS POLLICIS.—This muſcle runs by the inſide of the radius, ariſing from it, and the interoſſeous ligament; it has often, alſo, another head from the condyle of the humerus and fore part of the ulna. It paſſes under the annular ligament, and is inſerted into the laſt bone of the thumb. It bends the thumb.

PRONATOR RADII QUADRATUS.—This lies flat upon the interoſſeous ligament in the fore part of the arm, about two inches above the wriſt. It is nearly ſquare, its fibres going acroſs between the radius and ulna. It turns the radius upon the ulna.

MUSCLES SITUATED CHIEFLY ON THE HAND.

LUMBRICALES.—*Muſculi fidicinales.*—Four ſmall round muſcles, reſembling earth-worms. They ariſe in the palm of the hand, from the tendons of the profundus: their ſmall tendons reach the middle of the ſecond phalanx. They are chiefly uſeful in performing the quick ſhort motions of the fingers on muſical inſtruments, &c.

FLEXOR BREVIS POLLICIS MANUS.—A two-headed muſcle ſituated on the inſide of the thumb; one head ariſes from the os trapezium, the other from the os magnum. They are inſerted into the ſeſamoid bones and edge of the firſt bone of the thumb. The uſe of this muſcle is to bend the firſt joint of the thumb.

OPPONENS POLLICIS.—Lies under the abductor pollicis, ariſing from the os ſcaphoides and ligament of the wriſt. It is inſerted into the fore part of the metacarpal bone of the thumb. It bends the thumb, as in clenching the fiſt.

ABDUCTOR POLLICIS MANUS.—This muſcle lies immediately under the common integuments: it ariſes from the annular ligament of the wriſt, and from the os ſcaphoides, then bends gradually round the thumb to be inſerted into the firſt bone of the thumb. A ſecond muſcle is deſcribed, by Albinus, by the ſame name. It pulls the thumb from the fingers.

ABDUCTOR POLLICIS MANUS.—The metacarpal bone of the middle finger gives origin to this triangular muſcle; it goes directly acroſs to meet the thumb, and is inſerted into the root of the firſt phalanx. It draws the thumb towards the forefinger.

ABDUCTOR INDICIS MANUS.—A flat and broad muſcle: it ariſes from the os trapezium and the firſt bone of the thumb, and is inſerted into the back part of the firſt bone of the finger, which it pulls forwards towards the thumb.

Palmaris brevis.—*Palmaris cutaneus.*—A thin, flat, cutaneous muſcle: it ariſes from the palmar aponeuroſis, and ſtretches acroſs the hand to be inſerted into the metacarpal bone of the little finger, and the ſuperincumbent fat. It ſtretches the aponeuroſis of the palm of the hand.

Abductor minimi digiti manus.—A thin fleſhy muſcle upon which the hand reſts in writing: it ariſes from the os piſiforme, and the outer end of the annular ligament, and is inſerted laterally into the firſt bone of the little finger. It draws the little finger away from the reſt.

Adductor minimi digiti.—Ariſes from the ligament of the wriſt and cuneiform bone, and turns round the metacarpal bone of the little finger to be inſerted into the outſide of it. It pulls the metacarpal bone of the little finger towards the thumb.

Flexor parvus minimi digiti.—A ſmall thin muſcle which ariſes from the ligament of the wriſt and cuneiform bone, and accompanies the abductor minimi digiti, and has nearly the ſame inſertion. It bends the little finger.

Interossei externi et interni.—Theſe are ſmall muſcles lying between the metacarpal bones, and aſſiſting the lumbricales in bending the fingers.

MUSCLES OF THE INFERIOR EXTREMITIES.

Pectinalis.—*Pectinæus.*—A broad, flat, ſquare muſcle, lying under the ſkin, and ariſing from the os pubis, or *pectinis*, from that part of it which forms the brim of the pelvis, immediately above the foramen thyroideum; it then proceeds downwards to be inſerted by a long flat tendon into the linea aſpera of the thigh bone, juſt below the little trochanter. Its uſe is to bring the knees together; to raiſe the thigh upwards, and give it a degree of rotation outwards.

TRICEPS ADDUCTOR FEMORIS.—A broad flat muſcle with three heads, which have ſo little connexion with one another that they are uſually deſcribed as three muſcles:

1. *Adductor longus femoris.* This is the uppermoſt head; it ariſes from the upper and fore part of the pubis, by a ſhort roundiſh tendon, which becomes a thick fleſhy belly, and is inſerted by a flat tendon along the middle part of the linea aſpera.

2. *Adductor brevis femoris.* This portion lies under the former: it ariſes from the ſymphyſis of the pubis, by a thick flat tendon, which ſwells into a thick fleſhy belly; it then becomes flat, and is inſerted by a flat tendon into the upper part of the linea aſpera.

3. *Adductor longus femoris.* The head of this muſcle lies behind the former; it ariſes from the ſymphyſis pubis, and all along the flat edge of the foramen thyroideum, from whence it goes to be inſerted into the linea aſpera throughout its whole length, its fibres having various degrees of obliquity.

The uſe of all theſe muſcles is the ſame, to bring the thigh forwards and upwards.

OBTURATOR EXTERNUS.—This ſhort muſcle, ſo named from its origin, ariſes from the obturator ligament, and from the ramus iſchii and pubis, forming the ſides of the thyroid foramen. Its fleſhy fibres are ſoon gathered into a round tendon, which twiſts under the os femoris to be inſerted into the cavity at the root of the great trochanter. Its uſe is to roll the thigh obliquely outwards.

GLUTEUS MAXIMUS.—*Gluteus magnus. Gluteus major.*—This muſcle lies immediately under the ſkin, upon the poſterior part of the thigh, upon which we ſit; it ariſes fleſhy from the poſterior half of the ſpine of the ilium, from the junction of the ilium and ſacrum, from the whole external ſurface of the ſacrum, and from the ſacro-ſciatic ligament. All the fibres from theſe origins run obliquely forwards and downwards to the thigh bone, where they are gathered into a broad tendon, which is implanted into the great trochanter, and about three inches along the linea aſpera. It extends the thigh, by pulling it directly backwards and a little outwards.

Gluteus medius.—This lies immediately under the former: it ariſes from the anterior half of the ſpine of the ilium, and from its anterior ſuperior ſpinous proceſs. Its fibres all converge towards the great trochanter, into which the muſcle is inſerted by a broad tendon. Its uſe is to draw the thigh outwards and a little backwards, and to roll the thigh outwards, eſpecially when it is bended.

Gluteus minimus.—*Gluteus minor.*—A muſcle radiated like the former, but much ſmaller: it ariſes from the middle of the external ſurface of the ilium, from a ridge which is continued from the ſuperior anterior ſpinous proceſs. Its ſhort flat tendon is inſerted into the fore and upper part of the great trochanter. The uſe of this is to aſſiſt the other glutei muſcles.

Pyriformis.—*Iliacus externus. Pyramidalis.*—This muſcle is ſo named from its ſhape: it ariſes by three fleſhy and tendinous beginnings from the hollow of the ſacrum and ſacro-ſciatic notch, and growing gradually narrower, it paſſes betwixt the gluteus minor and gemini, and its round tendon is inſerted into the upper part of the cavity, at the inner ſide of the root of the great trochanter. The uſe of the pyriformis is to move the thigh upwards, and roll it outwards.

Gemini.—*Gemelli.*—This is a biceps muſcle, and its heads are ſo diſtinct, that they are often taken for two muſcles. The uppermoſt head is the larger and ſtronger one: it ariſes from the ſpinous proceſs of the iſchium; the ſmaller head begins from the outer end of the tuberoſity of the iſchium. Both heads are fleſhy in their whole length, and, meeting, form a tendon to be inſerted into the root of the great trochanter. This muſcle rolls the thigh bone outwards.

Quadratus femoris.—A thin flat muſcle which paſſes in a tranſverſe direction between the tuberoſity of the iſchium and the thigh bone. It ariſes from the outſide of the tuberoſity of the iſchium, and is inſerted into the ridge between the large and little trochanters. It rolls the thigh outwards.

MUSCLES SITUATED ON THE THIGH.

Tensor vaginæ femoris.—*Faſcialis. Muſculus aponeuroſis,* vel *faſciæ latæ.*—The anterior ſuperior ſpinous proceſs of the ilium gives riſe to this muſcle by a narrow tendinous and fleſhy ſlip, from whence it proceeds to be inſerted into the inſide of the faſcia of the thigh, which it ſtretches.

The faſcia of the thigh is a ſtrong, thick aponeuroſis, ſent off from the back, and from the tendons of the glutei and adjacent muſcles, to ſurround the muſcles of the thigh. It is ſtrongeſt and thickeſt on the outſide of the thigh, and towards the inſide becomes gradually thinner until it appears more like cellular membrane than an aponeuroſis. A little below the great trochanter it is firmly attached to the linea aſpera, and further down to that part of the head of the tibia which is next to the fibula, where it is expanded along the outſide of the leg. This faſcia ſerves to ſtrengthen the action of the muſcles by keeping them in their places when in action.

Sartorius.—A long muſcle that extends obliquely acroſs the whole thigh. It ariſes tendinous from the anterior ſuperior ſpinous proceſs of the ilium; it then forms a thin flat belly, ſomewhat like a ſtrap, which goes obliquely round the thigh to be inſerted into the inner ſide of the head of the tibia by a broad aponeuroſis. This muſcle acts in bending the leg obliquely inwards, and bringing one leg acroſs the other, an action common to taylors, whence it is termed the taylor's muſcle.

GRACILIS.—*Gracilis internus. Rectus internus femoris.*—A ſmall, thin, and flat muſcle: it ariſes tendinous from the pubis, near its ſymphyſis, and paſſes directly under the integuments down to the knee, to be inſerted under the ſartorius into the ſide of the head of the tibia. It aſſiſts the ſartorius in bending the leg.

RECTUS FEMORIS.—*Rectus cruris. Rectus* ſive *gracilis anterior.*—A thin flat biceps muſcle in the anterior part of the thigh, called *rectus*, from its ſtraight direction. It ariſes from the inferior anterior ſpinous proceſs of the ilium by a ſhort round tendon, and from the edge of the acetabulum and capſular ligament. A flat tendon is formed by the union of theſe heads, which ſoon becomes fleſhy, and the muſcle paſſes directly down towards the patella. This muſcle is united at the ſides to the vaſti, at the back part to the cruræus; and its tendon, along with that of the cruræus, goes to be implanted into the patella. It aſſiſts in extending the leg, in a very powerful manner.

VASTUS EXTERNUS.—A large muſcle ſituated on the fore part of the thigh. It ariſes by a thick and ſtrong tendon from the root of the great trochanter and upper part of the linea aſpera, and paſſes down the thigh, attached to the cruræus, and forms a flat tendon, which embraces the patella, and goes round the head of the tibia to be inſerted into the inner ſide of the knee. It extends the leg.

VASTUS INTERNUS.—This muſcle reſembles very much the former, but is not ſo large. It ariſes tendinous and fleſhy from the fore part of the little trochanter, and from the whole of the linea aſpera: its fibres run obliquely forwards and downwards, accompanying the cruræus, and the tendon ſurrounds the knee-pan to be inſerted into the outer part of the head of the tibia. The vaſtus internus aſſiſts the externus in extending the leg.

CRURÆUS.—*Cruralis.*—The little trochanter, and nearly the whole of the fore part of the os femoris, give origin to this muſcle. On its outer edge and fore part it is united to the vaſtus externus, and on its inner edge and fore part to the vaſtus internus. At its lower part the cruralis is joined to the tendon of the rectus, and forms one tendon, which is inſerted into the patella.

SUBCRURÆI.—Two little muſcular ſlips ſometimes found under the cruræus; they are inſerted into the capſular ligament, which they pull up. The cruræus aſſiſts in extending the leg.

SEMITENDINOSUS.—*Seminervoſus.*—A muſcle ſo called becauſe its lower half is compoſed of a ſmall round tendon. It ariſes tendinous and fleſhy from the poſterior portion of the tuberoſity of the iſchium, and continues a little way connected with the biceps cruris; it then leaves it, and goes obliquely inwards to form a long tendon, which paſſes down behind the inner tubercle of the knee to be inſerted into the inſide of the tibia, a little below its tuberoſity. Its uſe is to bend the leg backwards and a little inwards.

SEMIMEMBRANOSUS.—This muſcle begins and ends by a flat tendon, ſomewhat like a membrane: it ariſes by a broad, thin, and flat tendon, from the fore part of the tuberoſity of the iſchium, becomes thick and fleſhy in its middle, and terminates in a ſhort tendon, which is inſerted behind the head of the tibia, and, with the tendon of the ſemitendinoſus, forms the inner ham-ſtring. Its uſe is to bend the leg, and bring it directly backwards.

BICEPS FLEXOR CRURIS.—*Biceps cruris. Biceps.*—This muſcle, ſo named from its having two heads, lies immediately under the ſkin in the back part of the leg. It ariſes tendinous from the outer part of the tuberoſity of the iſchium, with the ſemitendinoſus. The other, which is the ſhort head, begins from the linea aſpera all the way down to its bifurcation. A little above the condyle of the femur the two heads unite, and the muſcle proceeds outwards to be inſerted into the head of the fibula, forming the outer ham-ſtring. Its uſe is to bend the leg.

POPLITEUS.—A ſmall triangular muſcle lying acroſs the back part of the knee-joint. It ariſes from the outer condyle of the femur, and is inſerted into a ridge on the back part of the tibia. It aſſiſts in bending the leg, and prevents the capſular ligament from being pinched.

MUSCLES SITUATED ON THE LEG.

GASTROCNEMIUS EXTERNUS.—*Gemellus.*—The large fleſhy muſcle which forms the calf of the leg. It ariſes by two heads from the external and internal condyles of the femur: the two heads meet and run down the calf with the appearance of a raphe between; they then form a flat tendon, very broad at its commencement, which paſſes down the leg, and unites with the tendon of the gaſtrocnemius internus a little above the ankle.

GASTROCNEMIUS INTERNUS.—*Soleus. Extenſor tarſi ſuralis.*—Some have compared this muſcle to a ſole fiſh. It ariſes, like the former, by two heads: the one from the back part of the head of the fibula; the other from the poſterior and upper part of the tibia: theſe immediately unite, and form a large fleſhy belly. About half way down the leg it becomes tendinous, and ſoon unites with the tendon of the gaſtrocnemius externus. From this union the great tendon, called *tendo Achillis*, is formed, which inſerts both muſcles into the extremity of the os calcis.

Plantaris.—*Tibialis gracilis*, vulgo *plantaris*. *Extenſor tarſi minor*, vulgo *plantaris*.—This muſcle appears to have been named *plantaris* from a miſtaken notion that it formed the plantar aponeuroſis, like the palmaris of the hand. It is a long and ſlender muſcle, ariſing fleſhy from the external condyle of the femur, and adhering firmly to the capſular ligament of the knee. It ſoon forms a ſmall flat tendon, which runs between the inner head of the external gaſtrocnemius, and the ſoleus, to be attached to the tendo Achillis, with which it is inſerted into the inner ſide of the os calcis. The uſe of this muſcle is to prevent the capſular ligament of the knee-joint from being pinched, and to aſſiſt the gaſtrocnemii muſcles.

Tibialis anticus.—This muſcle ariſes from the fore part and outſide of the tibia, beginning juſt under the head of the tibia. About two thirds down the bone it becomes tendon, which paſſes obliquely over the leg, croſſes the ankle, and goes under the annular ligament to be inſerted into the upper and inner part of the os cuneiforme internum, and metatarſal bone of the great toe. It extends the foot, and turns the toes inwards.

Tibialis posticus.—A penniform muſcle, ſo named from its ſituation. It ariſes from the back part and ridge of the tibia, from the oppoſite part of the fibula, and from the interoſſeous ligament quite down to the ankle. About the middle of the tibia it becomes tendinous and fleſhy, and the tendon paſſes in a groove at the inner ankle, and expands ſo as to graſp the bones of the tarſus, and is inſerted into the two firſt metatarſal bones, os calcis, and os cuboides. Its contraction pulls the foot in ſo as to put the toes together.

PERONEUS LONGUS.—*Peroneus maximus,* vulgo *peroneus poſterior. Peroneus primus,* ſeu *poſticus.*—This muſcle ariſes from the fore part of the head of the fibula, and from the upper part of that bone. It has alſo a ſmall ſlip coming from the upper part of the tibia. About the middle of the leg its tendon emerges towards the integuments, and paſſing the outer ankle in a cartilaginous pulley, which alſo tranſmits the peroneus brevis, it is reflected to the ſinuoſity of the os calcis, and runs along a groove in the os cuboides to be inſerted tendinous into the outſide of the root of the metatarſal bone of the great toe, and the os cuneiforme internum. It moves the foot outwards, and aſſiſts in extending it.

PERONEUS BREVIS.—*Peroneus medius,* vulgo *peroneus anticus. Peroneus ſecundus,* ſeu *anticus.*—Ariſes fleſhy from above the middle of the external part of the fibula, all the way down to the ankle; it alſo adheres to the tendinous partition between it and the common extenſors. Its tendon paſſes under that of the peroneus longus, by the outer ankle, to be inſerted into the metatarſal bone of the little toe. This muſcle aſſiſts the former in pulling the foot outwards and extending it a little.

EXTENSOR LONGUS DIGITORUM PEDIS.—*Extenſor longus. Peroneus tertius. Nonus Veſalii.*—A common extenſor muſcle of the toes. It ariſes from the outer and fore part of the head of the tibia, juſt below the knee; alſo from the head of the fibula, the interoſſeous ligament, and the tendinous faſcia of the leg. It ſoon becomes a thick fleſhy muſcle, and is divided into three diſtinct portions, which form three round tendons that paſs obliquely inwards under the annular ligament of the tarſus, where the firſt portion divides its tendon into two.

Theſe four tendons are inſerted flat into the root of the firſt joint of each of the four ſmall toes, expanding along the upper ſide as far as the root of the laſt joint. A portion of this muſcle alſo ariſes from the middle of the fibula, and ſends its fleſhy fibres forwards to a tendon which goes under the annular ligament to be inſerted into the root of the metatarſal bone of the little toe. This portion is termed, by Albinus, *peroneus tertius*.

Extensor proprius pollicis pedis.—*Extenſor longus.*—An extenſor muſcle of the great toe. It ariſes by an acute, tendinous, and fleſhy beginning, from the head of the fibula: it continues a ſlender muſcle down the fibula, and its tendon paſſes under the annular ligament to be inſerted into the poſterior part of the laſt and firſt joint of the great toe.

Flexor longus digitorum pedis.—*Profundus. Perforans.*—This muſcle ariſes from nearly the whole of the back part of the tibia. Near the ankle it becomes tendinous, croſſes the tendon of the tibialis poſticus behind the ankle joint, and goes forward in a groove of the os calcis, and about the middle of the ſole of the foot divides into four tendons, which paſs through the ſlits of the *perforatus* to be inſerted into the extremity of the laſt joint of the four leſſer toes. Juſt before the diviſion of the tendon, it receives a conſiderable tendon from that of the flexor pollicis longus. The uſe of the perforans is to bend the laſt joint of the toes.

Flexor digitorum accessorius.—*Maſſa carnea Jacobi Sylvii.*—This is a ſmall fleſhy maſs connected with the former muſcle, whoſe office it aſſiſts. It ariſes from the lower part of the os calcis, and from its tuberoſity, and is inſerted into the flexor longus digitorum pedis at its diviſion into four tendons.

Flexor longus pollicis pedis.—A flexor muſcle of the great toe, ariſing fleſhy from the upper part of the fibula, and being continued down the ſame bone almoſt to the ankle by a double order of oblique fleſhy fibres. Its tendon paſſes under the annular ligament to be inſerted into the laſt joint of the great toe.

MUSCLES CHIEFLY SITUATED ON THE FOOT.

Extensor brevis digitorum pedis.—*Extenſor brevis.*—A common extenſor of the toes, very cloſely connected with the extenſor longus digitorum pedis. It ariſes fleſhy and tendinous from the fore part of the os calcis, and, paſſing forwards, ſoon divides into diſtinct muſcular heads, from each of which a tendon is ſent off to be inſerted into the great toe, and the three next to it, with the extenſor longus.

Flexor brevis digitorum pedis.—*Perforatus. Sublimis.*—This muſcle is placed on the ſole of the foot: it ariſes from the inferior and poſterior part of the os calcis, ſoon becomes a fleſhy belly, and divides into four tendons, which are ſplit about the root of the firſt bone of the toes for the paſſage of the tendons of the flexor longus digitorum pedis. The tendons of the brevis then go on to be inſerted into the ſecond phalanx of the four leſſer toes, which they bend.

Lumbricales pedis.—Theſe four ſmall muſcles reſemble ſomewhat the earth-worm, or *lumbricus*. They ariſe from the forks of the tendons of the flexor profundus, and paſs on to be inſerted by ſlender tendons into the inſide of the firſt joint of the four leſſer toes. Their uſe is to bend the firſt joint of the toes, and to draw them towards the great toe.

Flexor brevis pollicis pedis.—Ariſes by a long tendon from the under and fore part of the os calcis, and from the os cuneiforme externum; it ſoon divides into two heads, one of which goes to the abductor, and the other to the adductor pollicis, and is inſerted with the tendons of thoſe muſcles into the external ſeſamoid bone and root of the firſt joint of the great toe, which it bends.

ABDUCTOR POLLICIS PEDIS.—*Thenar.*—Ariſes by ſhort tendinous fibres from the inner and lower part of the os calcis, and is inſerted tendinous into the internal ſeſamoid bone and root of the firſt joint of the great toe. Its uſe is to pull the great toe from the reſt.

ADDUCTOR POLLICIS PEDIS.—*Antithenar.*—Ariſes by a long delicate tendon from the ligament extending from the os calcis to the os cuboides, ſoon divides into two fleſhy heads, which again unite and go obliquely inwards to be inſerted into the ſeſamoid bone, or firſt bone of the great toe. Its uſe is to bring this toe nearer to the reſt.

ABDUCTOR MINIMI DIGITI PEDIS.—A ſlender muſcle lying on the outſide of the foot. It ariſes from the tuberoſity of the os calcis: it forms two ſmall tendons; the ſhorter one is inſerted into the root of the metatarſal bone of the little toe, and the longer goes on to be fixed into the root of the firſt bone of that toe. Its uſe is to bend the little toe, and carry it a little outwards, and to ſupport the tarſus in walking.

FLEXOR BREVIS MINIMI DIGITI PEDIS.—*Parathenar minor,*—A very ſmall muſcle ariſing from the metatarſal bone of the little toe, which it goes over to be inſerted into the root of the firſt bone of the little toe. Its uſe is to bend this toe.

TRANSVERSALIS PEDIS.—This muſcle extends tranſverſely acroſs the ſole of the foot, ariſing from the ligament which connects the bones of the tarſus going acroſs to be inſerted into the tendon of the adductor pollicis. It contracts the foot.

INTEROSSEI EXTERNI et INTERNI.—Four ſmall double-headed muſcles ſituated externally, and four internally, all ariſing from the metatarſal bones they lie between. Their tendons meet thoſe of the long and ſhort extenſors, the lumbricales forming altogether the ſheath which covers the upper part of the toes.

The muſcles ſituated on the ſole of the foot are covered by a ſtrong flat tendon, called the *plantar aponeuroſis*, extended from the os calcis to the firſt joint of all the toes, protecting the muſcles, blood-veſſels, and nerves running under it.

PHYSIOLOGY AND PHENOMENA OF MUSCULAR MOTION.

Muſcular motions are of three kinds; namely, voluntary, involuntary, and mixed.

The VOLUNTARY MOTIONS of muſcles are ſuch as proceed from an immediate exertion of the active powers of the will: thus the mind directs the arm to be raiſed or depreſſed, the knee to be bent, the tongue to move, &c.

The INVOLUNTARY MOTIONS of muſcles are thoſe which are performed by organs, ſeemingly of their own accord, without any attention of the mind or conſciouſneſs of its active power; as the contraction and dilatation of the heart, arteries, veins, abſorbents, ſtomach, inteſtines, &c

The MIXED MOTIONS are thoſe which are in part under the control of the will, but which ordinarily act without our being conſcious of their acting; as is perceived in the muſcles of reſpiration, the intercoſtals, the abdominal muſcles, and the diaphragm.

When a muſcle acts, it becomes ſhorter and thicker; both its origin and inſertion are drawn towards its middle. The ſphincter muſcles are always in action: and ſo likewiſe are antagoniſt muſcles, even when they ſeem at reſt. When two antagoniſt muſcles move with equal force, the part which they are deſigned to move remains at reſt; but if one of the antagoniſt muſcles remain at reſt, while the other acts, the part is moved towards the centre of motion.

All the muſcles of living animals are conſtantly endeavouring to ſhorten themſelves.

When a muſcle is divided, it contracts. If a muſcle be ſtretched to a certain extent, it contracts, and endeavours to acquire its former dimenſions, as ſoon as the ſtretching cauſe is removed: this takes place in a dead body, in muſcles cut out of the body, and alſo in parts not muſcular, and is called by the immortal Haller *vis mortua*, and by ſome *vis elaſtica*. It is greater in living than in dead bodies, and is called the *tone* of the muſcle.

When a muſcle is wounded, touched, or otherwiſe irritated, it contracts, independent of the will; this power is called IRRITABILITY, and by Haller *vis inſita*; it is a property peculiar to, and adherent in, the muſcles. The parts of our body which poſſeſs this property are called irritable, as the heart, arteries, muſcles, &c. to diſtinguiſh them from thoſe parts which have no muſcular fibres. With regard to the degree of this property peculiar to various parts, the heart is the moſt irritable, then the ſtomach and inteſtines, the diaphragm, the arteries, veins, abſorbents, and at length the various muſcles follow; but the degree of irritability depends upon the age, ſex, temperament, mode of living, climate, ſtate of health, idioſyncraſy, and likewiſe upon the nature of the ſtimulus.

When a muſcle is ſtimulated, either through the medium of the will or any foreign body, it contracts, and its contraction is greater or leſs in proportion as the ſtimulus applied is greater or leſs. The contraction of muſcles is different according to the purpoſe to be ſerved by their contraction; thus, the heart contracts with a jerk; the urinary bladder, ſlowly and uniformly; puncture a muſcle, and its fibres vibrate; and the abdominal muſcles act ſlowly in expelling the contents of the rectum. Relaxation generally ſucceeds the contraction of muſcles, and alternates with it.

The USE of this property is very conſiderable; for upon it depend all muſcular action, and the function of every viſcus, except that of the nerves.

DISEASED APPEARANCES OF MUSCLES.

MUSCLE CONVERTED INTO BONE. A portion of a muſcle is occaſionally converted into bone: this is obſerved in the heart, in the muſcular coat of arteries, and in the diaphragm. It conſiſts in a diſeaſed action of the nutritious arteries, by which they depoſit bony or earthy particles, inſtead of muſcular matter.

MUSCLES DIMINISHED IN SIZE. A general diminution of the bulk of muſcles in the body, or emaciation, is a very common occurrence: but, beſides this, the anatomiſt occaſionally finds an obvious waſting of a ſingle muſcle; as the heart, the biceps, &c. This in moſt inſtances ariſes from a deficiency of nervous power in the muſcle.

CHANGE OF COLOUR OF MUSCLES. The healthy colour of muſcle is a ſtorid or fleſh colour. Muſcles that have become paralytic, and muſcles of dropſical ſubjects, are moſtly of a paler hue. Beſides this, a muſcle has been known to have changed its colour to a pale yellow, reſembling fat, whilſt the ſurrounding ones poſſeſſed their healthy appearance.

INFLAMMATION OF MUSCLES. This affection occurs very frequently. It conſiſts in an increaſe of vaſcularity; the muſcle appears of a dark red colour, and is more readily torn than healthy muſcles.

Abscesses in muscles. Theſe are frequently met with in anatomical inveſtigations. It does not appear, when an abſceſs is found in a muſcle, that any part of the muſcle is converted into pus, but the fibres have the appearance of being ſeparated from one another, and compreſſed together, to make way for the formation of the abſceſs, and very frequently they are abſorbed. This perhaps accounts for the ſpeedy filling up of the ſpace occupied by an immenſe abſceſs in two or three days after affording an exit to the pus; *i. e.* by the elaſtic and compreſſed muſcular fibres regaining their former ſituation. The ſides of the abſceſs are not formed of muſcular fibre, but of a condenſed cellular membrane, and ſometimes a tunic of coagulable lymph, in which an immenſe number of ſmall arteries are found, as is evinced by diſſection, and injections. When the latter are puſhed to a great extent, and the injection is ſucceſsful, ſmall veſſels are found to have ſhot out here and there, ſo as to give the internal ſurface of the abſceſs a ſomewhat flocculent appearance. In ſcrophulous abſceſſes between muſcular fibres, the coat of the abſceſs is moſtly much thicker than in other caſes.

Gangrene of muscles. In this diſeaſe the muſcle is pulpy, black, and fetid.

Flaccidity of muscles. This is occaſionally obſerved to a conſiderable degree. In general it depends upon a ſluggiſh action of the powers of life for ſome time before death.

Morbid contraction of muscles. This may ariſe from the want of action in the antagoniſts, or from ſome other cauſes. It conſiſts in a permanent contraction of the muſcle to a degree beyond its healthy contraction. It is met with principally in the flexors of the legs of the aged.

BURSALOGY;

OR,

DOCTRINE OF THE BURSÆ MUCOSÆ.

Burſæ mucoſæ are mucous bags, compoſed of a proper membrane, containing a kind of mucous fat, formed by the exhaling arteries of their internal ſurface. They are of different *ſizes* and *firmneſs*, and *connected* here and there by cellular membrane, with the capſular ligaments of cavities, tendons, bones, or ligaments. Their *internal ſurface* is highly vaſcular, ſmooth, and ſhining.—SITUATION. Various.

DIVISION. Into *vaginal* and *veſicular*.

USE. To lubricate the muſcles and tendons, which are very frequently in motion.

BURSÆ MUCOSÆ OF THE HEAD.

1. *A burſa of the ſuperior oblique muſcle* of the eye, ſituated behind its trochlea in the orbit.—2. *The burſa of the digaſtricus*, ſituated in the internal ſurface of its tendon.—3. *A burſa of the circumflexus*, or tenſor palati, ſituated between the hook-like proceſs of the ſphænoid bone and the tendon of that muſcle.—4. *A burſa of the ſterno-hyoideus muſcle*, ſituated between the os hyoides and larynx.

BURSÆ MUCOSÆ SITUATED ABOUT THE SHOULDER JOINT.

1. *The external acromial*, ſituated under the acromion, between the coracoid proceſs, deltoid muſcle, and capſular ligament.—2. *The internal acromial*, ſituated above the tendon of the infra-ſpinatus and teres major: it often communicates with

the former.—3. *The coracoid burſa*, ſituated near the root of the coracoid proceſs: it is ſometimes double, and ſometimes triple. — 4. *The clavicular burſa*, found where the clavicle touches the coracoid proceſs.—5. *The ſubclavian burſa*, between the tendon of the ſubclavicularis muſcle and the firſt rib.—6. *The coraco-brachial*, placed between the common origin of this muſcle, the biceps, and the capſular ligament.—7. *The burſa of the pectoralis major*, ſituated under the head of the humerus, between the internal ſurface of the tendon of that muſcle and another burſa placed on the long head of the biceps.—8. *An external burſa of the teres major*, under the head of the os humeri, between it and the tendon of the teres major.—9. *An internal burſa of the teres major*, found within the muſcle where the fibres of its tendon diverge. — 10. *A burſa of the latiſſimus dorſi*, between the tendon of this muſcle and the os humeri.—11. *The humero-bicipital burſa*, in the vagina of the tendon of the biceps. There are other burſæ mucoſæ about the humerus, but their ſituation is uncertain.

BURSÆ MUCOSÆ SITUATED NEAR THE ELBOW JOINT.

1. *The radio-bicipital*, ſituated between the tendon of the biceps, brachialis, and anterior tubercle of the radius.—2. *The cubito-radial*, between the tendon of the biceps, ſupinator brevis, and the ligament common to the radius and ulna.—3. *The anconeal burſa*, between the olecranon and tendon of the anconeus muſcle.—4. *The capitulo-radial burſa*, between the tendon common to the extenſor carpi radialis brevis, and extenſor communis digitorum and round head of the radius. There are other burſæ, but as their ſituation varies, they are omitted.

BURSÆ OF THE INFERIOR PART OF THE FORE-ARM AND HAND.

On the inſide of the wriſt and hand.

1. A very *large burſa*, for the tendon of the flexor pollicis longus.—2. *Four ſhort burſæ* on the fore part of the tendons of the flexor ſublimis.—3. *A large burſa* behind the tendon of the flexor pollicis longus, between it and the fore part of the radius, capſular ligament of the wriſt, and os trapezium.—4. *A large burſa* behind the tendons of the flexor digitorum profundus, and on the fore part of the end of the radius, and fore part of the capſular ligament of the wriſt. In ſome ſubjects it communicates with the former.—5. *An oblong burſa*, between the tendon of the flexor carpi radialis and os trapezium.—6. *A very ſmall burſa* between the tendon of the flexor carpi ulnaris and os piſiforme.

On the back part of the hand and wriſt.

7. *A burſa* between the tendon of the abductor pollicis longus and the radius.—8. *A large burſa* between the two extenſores carpi radiales —9. *Another* below it, common to the extenſores carpi radiales.—10. *A burſa* at the inſertion of the tendon of the extenſor carpi radialis.—11. *An oblong burſa*, for the tendon of the extenſor pollicis longus, and which communicates with 9.—12. *A burſa*, for the tendon of the extenſor pollicis longus, between it and the metacarpal bone of the thumb —13. *A burſa* between the tendons of the extenſor of the fore, middle, and ring fingers.—14. *A burſa* for the extenſors of the little finger.—15. *A burſa* between the tendon of the extenſor carpi ulnaris and ligament of the wriſt. There are alſo burſæ mucoſæ between the muſculi lumbricales and interoſſei.

BURSÆ SITUATED NEAR THE HIP JOINT.

On the fore part of the joint.

1. *The ileo-puberal*, ſituated between the iliacus internus, pſoas magnus, and the capſular ligament of the head of the femur.—2. *The pectineal*, between the tendon of the pectineus and the thigh-bone.—3. *A ſmall burſa* of the gluteus medius muſcle, ſituated between it and the great trochanter, before the inſertion of the pyriformis.—4. *A burſa* of the gluteus minimus muſcle, between its tendon and the great trochanter.—5. *The gluteo-faſcial*, between the gluteus maximus and vaſtus externus.

On the poſterior part of the hip joint.

6. *The tubero-iſchiatic burſa*, ſituated between the obturator internus muſcle, the poſterior ſpine of the iſchium, and its tuberoſity.—7. *The obturatory burſa*, which is oblong, and found between the obturator internus and gemini muſcles and the capſular ligament.—8. *A burſa of the ſemi-membranoſus*, under its origin and the long head of the biceps femoris.—9. *The gluteo-trochanteral burſa*, ſituated between the tendon of the pſoas muſcle and the root of the great trochanter—10. *Two glutei-femoral burſæ*, ſituated between the tendon of the gluteus maximus and os femoris.—11. *A burſa of the quadratus femoris*, ſituated between it and the little trochanter.—12. *The iliac burſa*, ſituated between the tendon of the iliacus internus and the little trochanter.

BURSÆ MUCOSÆ SITUATED NEAR THE KNEE JOINT.

1. *The ſupra-genual*, which adheres to the tendons of the vaſtus and cruralis and the fore part of the thigh-bone.—2. *The infra-genual burſa*, ſituated under the ligament of the patella, and often communicates with the above.—3. *The anterior ge-*

nual, placed between the tendon of the ſartorius, gracilis, and ſemi-tendinoſus, and internal and lateral ligament of the knee. —4. *The poſterior genual*, which is ſometimes double, and is ſituated between the tendons of the ſemi-membranoſus, the internal head of the gaſtrocnemius, the capſular ligament, and internal condyle.—5. *The popliteal*, conſpicuous between the tendon of that muſcle, the external condyle of the femur, the ſemilunar cartilage, and external condyle of the tibia.—6. *The burſa of the biceps cruris*, between the external part of the tendon of the biceps cruris, and the external lateral ligament of the knee.

BURSÆ MUCOSÆ SITUATED IN THE FOOT.

On the back, ſide, and hind part of the foot.

1. *A burſa of the tibialis anticus*, between its tendon, the lower part of the tibia, and capſular ligament of the ankle.—2. *A burſa* between the tendon of the extenſor pollicis pedis longus, the tibia and capſular ligament of the ankle.—3. *A burſa of the extenſor digitorum communis*, between its tendons, the tibia, and ligament of the ankle.—4. *A large burſa*, common to the tendons of the peronei muſcles.—5. *A burſa of the peroneus brevis*, proper to its tendon.—6. *The calcaneal burſa*, between the tendo Achillis and os calcis.

In the ſole of the foot.

1. *A burſa for the tendon of the peroneus longus.*—2. *A burſa* common to the tendon of the flexor pollicis pedis longus, and the tendon of the flexor digitorum pedis communis longus profundus.—3. *A burſa of the tibialis poſticus*, between its tendon, the tibia, and aſtragalus.—4. *Five burſæ for the flexor tendons*, which begin a little above the firſt joint of each toe, and extend to the root of the third phalanx or inſertion of the tendons.

DISEASED APPEARANCES OF THE BURSÆ.

The burſæ mucoſæ are very frequently found inflamed, relaxed, and containing a diſeaſed fluid.

ANGIOLOGY;

OR,

DOCTRINE OF THE VESSELS.

Veſſels are long membranous canals which carry blood, lymph, chyle, or a ſecreted fluid.

Division. Into arteries, veins, abſorbents, and excretory ducts.

Situation. Except the epidermis, membrana arachnoidea, and nails, every part of the body has veſſels, which injections demonſtrate.

OF ARTERIES.

Arteries are elaſtic membranous canals, which pulſate. They always become narrower as they proceed from the heart towards the extremities.

Origin. From the ventricles of the heart; namely, the *pulmonary artery* from the right, and the *aorta* from the left ventricle: ſo that there are only two arteries, the reſt being branches of theſe two.

Termination. In veins, exhaling veſſels, or they anaſtomoſe with one another.

Composed of three membranes, called *coats*; an *external* one, a *middle* coat, which is *muſcular*, and an *inner* one, which is ſmooth.

USE. To convey blood from the heart to the different parts of the body, for nutrition, preſervation of life, generation of heat, and the ſecretion of different fluids.

AORTA.

The aorta ariſes from the left ventricle of the heart, forms an *arch* towards the dorſal vertebræ, then *deſcends* through the diaphragm into the abdomen, in which it proceeds by the left ſide of the ſpine to the laſt vertebra of the loins, where it divides into the *two* iliac arteries. In this courſe it gives off, juſt above its origin, two *coronary* arteries to the heart, and then forms an arch.

> Oſſification of the coronary arteries of the heart is not an uncommon diſeaſe. It is ſuppoſed by ſome to be the cauſe of *angina pectoris*. In three inſtances, however, where theſe arteries were completely become bone to the extent of two and three inches, no ſuch diſeaſe exiſted.
>
> The aſcending portion of the aorta and its arch are moſt frequently the ſeat of aneuriſm.

The ARCH OF THE AORTA gives off three branches, which ſupply the head, neck, and arms with blood; theſe are,

I. ARTERIA INNOMINATA, which divides into the right carotid and right ſubclavian arteries.

II. The LEFT CAROTID.

III. The LEFT SUBCLAVIAN.

The CAROTID ARTERIES, having emerged from the cheſt, run up along the neck, one on each ſide of the trachea, to the angle of the lower jaw, where they divide into external and internal.

> The external carotid has been the ſeat of aneuriſm; and, in one caſe, two aneuriſms were found in the left carotid.

The EXTERNAL CAROTID gives off eight branches to the neck and face:

1. *Arteria thyroidea*, which is very tortuous, ſupplies the thyroid gland, and gives off branches to ſeveral adjacent muſcles.

2. *A. lingualis*, which lies flat upon the ſide of the tongue, and gives off the *ramus hyoideus*, *dorſalis linguæ*, *ſublingualis*, and *ranina*.

3. *A. labialis*, called alſo the *external maxillary*, the *angular*, and *facial* artery: it gives off the *palatina inferior*, the *ſubmentalis*, and the *coronary of the lips*.

4. *A. pharyngea inferior*, which ſends a number of ſmall twigs about the fauces and baſis of the cranium.

5. *A. occipitalis*, from which the *poſterior temporal* ariſes.

6. *A. poſterior auris*, which furniſhes the parts about the cartilages of the ear with blood, and tranſmits the *arteria tympani* and *ſtylo-maſtoidea*.

7. *A. maxillaris interna*, which is extremely tortuous, and gives off—the *ſpinous artery* to the dura mater; the *lower maxillary artery*, which is included in the lower jaw, and ſupplies the teeth and face; the *pterygoid arteries*, which nouriſh the pterygoid muſcles; *two deep temporal arteries*, which lie wider than the temporal muſcle. The internal maxillary then gives off a *branch*, which almoſt immediately divides into the *alveolar* and *infra-orbital*; then an artery to the palate, the *ſuperior palatine*; the *upper pharyngeal*, which plays about the ſphænoid ſinus; and laſtly, the *naſal artery*, which is tranſmitted through the ſphæno-palatine foramen to the cavity of the noſtrils.

8. *A. temporalis*, which perforates the parotid gland, and ſends off the *tranſverſalis faciei*, which inoſculates with the arteries of the face; and ſeveral branches which go to the ear, forehead, and about the temples.

This artery is frequently opened in inflammatory affections of the head.

The INTERNAL CAROTID leaves the external at the angle of the jaw, and proceeds by the par vagum and intercoſtal nerve to the carotid canal in the petrous portion of the temporal bone, where it is ſhaped like the letter *ſ*, and enters the cranium at the ſide of the ſella turcica, having given off *two* very ſmall *twigs* to the pituitary gland, and 3d, 4th, and 5th pair of nerves; and when it has reached the anterior clinoid proceſs, it ſends off—

1. *Arteria ophthalmica*, which is diſtributed on the eye.

2. *A. anterior cerebri*, which proceeds before the ſella turcica, unites with its fellow, and forms the circle of Willis, from which a branch proceeds to the third ventricle, ſeptum lucidum, and the *arteria corporis calloſi*.

3. *A. media cerebri*, which runs between the anterior and middle lobes of the brain, gives off the *artery of the choroid plexus*, and is loſt on the middle lobe of the brain.

4. *A. communicans*, which proceeds backwards, and ſoon inoſculates with the vertebral.

> The cerebral arteries are moſtly oſſified, or have opacities which are progreſſive to oſſification, in old age. In every inſtance of apoplexy in aged people, from extravaſated blood in the brain, this diſeaſed ſtate of the arteries exiſts.

The SUBCLAVIAN ARTERY ariſes on the right ſide, from the arteria innominata; and on the left, from the arch of the aorta.

> The ſubclavian artery is ſometimes morbidly dilated. Aneuriſm ariſing by the ſide of the clavicle has been incautiouſly opened, by miſtaking it for a common abſceſs.

Each SUBCLAVIAN gives off five branches:

1. The *internal mammary*, from which ariſe the *A. thymica*, *A. comes phrenici*, the *pericardiac*, and the *phrenico-pericardiac*.

2. The *inferior thyroid*, from which ariſe the *ramus thyroideus*, the *tracheal arteries*, the *aſcending thyroid*, and the *tranſverſalis humeri*.

3. *A. vertebralis*, which proceeds into the vertebral foramina, to aſcend into the cavity of the cranium, where it unites upon the cuneiform proceſs of the occipital bone with its fellow of the other ſide, and forms the BASILARY ATRERY, which immediately gives off the *poſterior* artery of the cerebellum; it then proceeds upon the tuberculum annulare, to give off four branches, two to the right, and two to the left, which conſtitute the *A. anterior cerebelli*, which branch to the crura cerebelli, the cerebellum, vermis, crura cerebri, corpora quadrigemina, pineal gland, and fourth ventricle; and the *A. poſterior cerebri*, which is joined by the *communicans*, and ſupply the thalami nervorum opticorum, the centrum geminum, ſemicirculate infundibulum, and crura fornicis, and the poſterior lobes of the brain, inoſculating with ſeveral arteries.

4. *A cervicalis profunda.*

5. *A. cervicalis ſuperficialis*, both of which are diſtributed about the muſcles of the neck.

6. *A. intercoſtalis ſuperior*, which lies between the two upper ribs.

7. *A. ſupra-ſcapularis*, which ſometimes ariſes from the *A. thyroidea*, when it is called the *tranſverſalis humeri.*

As ſoon as the ſubclavian has arrived in the axilla, it is called the AXILLARY ARTERY, which runs into the arm, where it is termed the BRACHIAL.

The AXILLARY ARTERY gives off—

1. The *four mammary arteries*, called *thoracica ſuperior*, *thoracica longior*, *thoracica humeriana*, and *thoracica alaris* or *axillaris*, which ſupply blood to the muſcles about the breaſt.

2. The *ſubſcapularis,* which ſupplies the lower ſurface of the ſcapula.

3. The *circumflexa poſterior.*

4. *Circumflexus anterior,* which ramify about the joint.

The BRACHIAL or HUMERAL artery gives off—

1. *Many lateral veſſels.*

2. *A. profunda humeri ſuperior.*

3. *A. profunda humeri inferior.*

4. *Ramus anaſtomoticus magnus,* which anaſtomoſes round the elbow joint.

The brachial artery is frequently the ſeat of aneuriſm.

The brachial artery then becomes the ulnar, and gives off the RADIAL.

The ULNAR or CUBITAL ARTERY ſends off—

1. The *recurrent branches,* which anaſtomoſe with the ramus anaſtomoticus magnus.

3. *A. interoſſea communis.* It then ſends ſmall branches to the adjacent muſcles, as it proceeds down to the wriſt; juſt before it arrives here, it gives off *A. dorſalis ulnaris,* which goes round to the back of the little finger. At the wriſt it gives off *A. palmaris profunda*; then forms a great arterial arch, called the *ſuperficial palmar arch,* which ſupplies branches to the fingers.

The RADIAL gives off the *radial recurrent,* proceeds to the wriſt, where the pulſe is felt, and gives off the *ſuperficialis volæ,* and then divides into the *A. dorſalis pollicis, A. radialis indicis, A. magna pollicis,* and *A. palmaris profunda.*

> The radial artery is generally felt by the phyſician to count the frequency of the pulſe. Malformation or diſeaſe about the arm often cauſes the pulſe in one arm to be different from that of the other; therefore both pulſes ſhould be felt.

The radial artery is frequently oſſified throughout ; it then feels knotty, and the pulſation is very obſcure, and often wanting.

The DESCENDING AORTA gives off, in the breaſt—

1. The *bronchial*, which nouriſh the lungs.

2. The *œſophageal*, which go to the œſophagus.

3. The *intercoſtals*, between the ribs.

5. The *inferior diaphragmatic.*

Within the abdomen it gives off eight branches—

1. The *cœliac*, which divides into three branches:

1. *Arteria hepatica*, which gives off—

α. *A. duodeno-gaſtrica*, which ſends off the *right gaſtro-epiploic* and the *pancreatico-duodenalis*. The latter tranſmits the *pilorica inferior* and the *tranſverſe pancreatic.*

β. *A. pilorica ſuperior hepatica.*

The hepatic artery then ramifies through the liver.

2. *A. coronaria ventriculi*, or *gaſtrica*, which gives off the *ſuperior coronary* and *ſuperior piloric arteries.*

3. *A. ſplenica*, from which ariſe the *pancreatica magna* and *pancreaticæ parvæ*, the *poſterior gaſtric arteries*, the *left gaſtro-epiploic artery*, and the *vaſa brevia.*

The cœliac artery has been found aneuriſmal.

2. The *ſuperior meſenteric*, or *meſeraic*, of which the *colica media*, *colica dextra*, and the *ileo-colica*, are branches.

3. The *renal arteries*, or *emulgents*, which are ſhort, and divide into three or four branches in the pelvis of the kidney.

4. The *ſpermatic arteries*, which are very ſmall and long, and proceed with the ſpermatic cord to the teſticles.

5. The *inferior meſeraic*, from which ariſes the *let colic artery* and the *internal hæmorrhoidal.*

6. The *lumbar arteries*, which nouriſh the muſcles and vertebræ of the loins.

7. The *middle ſacral artery*, which is diſtributed about the ſacrum.

The aorta then biſurcates, and becomes the iliac arteries.

The iliac ſoon divides into *internal* and *external.*

Each INTERNAL ILIAC, or HYPOGASTRIC ARTERY, gives off five branches:

1. The *lateral ſacral arteries*, three or four in number.

2. The *gluteal*, which ramify upon the back of the iliac portion of the os innominatum, and ſupply the gluteal muſcles.

3. The *iſchiatic*, which turns downwards along the hip, and gives off the *coccygeal artery.*

4. *Arteria pudica communis*, which is ſometimes a branch of the ſciatic artery; it proceeds out of the pelvis, through the ſciatic notch, returns into the pelvis, and runs towards the ſymphyſis of the pubis. In this courſe it gives off *branches* to the veſiculæ ſeminales and proſtate gland; and the *lower* or *external hæmorrhoidal artery* to the anus, and then forms the *A. perinei*, the *A. penis*, which proceed one on each ſide; and a *branch* which plunges deep into the ſubſtance of the penis.

5. The *obturatory*, which paſſes through the oval foramen, and is diſtributed on the thick muſcles in the centre of the thigh.

Each EXTERNAL ILIAC gives off—

1. The *epigaſtric*, which is reflected from Poupart's ligament, upwards, along the abdomen.

> This artery is occaſionally wounded by the trochar, in the operation of tapping an aſcites, when a fatal hæmorrhage takes place. In one inſtance the patient died about twenty minutes after perforating the abdomen, which was found, *poſt mortem*, full of blood. The improved method of tapping, however, in the *linea alba*, does away this inconvenience.

2. *A. circumflexa iliaca*, which runs backwards along the criſta ilii.

The EXTERNAL ILIAC then paſſes under Poupart's ligament, becomes the FEMORAL or CRURAL ARTERY, and is continued along the thigh into the popliteal. In this courſe it gives off, near the groin—

1. The *profunda femoris*, which gives off the *A. perforans prima*, the *A. perforans ſecunda magna*, the *A. perforans tertia*, the *A. perforans quarta*, which nouriſh the muſcles of the thigh. The femoral artery then makes a ſpiral turn round the os femoris, and ſends off ſmall branches of no importance to adjacent muſcles. About two hands breadth from the knee it gives out—

2. The *ramus anaſtomaticus magnus*, which ramifies about the knee joint.

The femoral artery, having reached the ham, is called the POPLITEAL, which gives off ſeveral ſmall branches about the joint, and divides below the ham into the *tibialis antica* and *tibialis poſtica*.

The popliteal artery is more frequently affected with aneuriſm than any other.

The TIBIALIS ANTICA ſoon perforates the interoſſeous ligament, and paſſes along the tibia over the bones of the tarſus,* and then inoſculates with the back arteries. In this courſe it gives off—

1. The *recurrent*, which inoſculates with the anterior branches of the popliteal; it then ſends off ſmall branches to neighbouring muſcles as it paſſes down the leg.

2. *A. malleolaris interna*, about the inner ankle.

3. *A. malleolaris externa*, about the outer ankle.

4. *A. tarſea*, which lies upon the bones of the tarſus.

5. *A. metatarſea,* to the tendons of the peronei muſcles.

6. *Dorſalis externa hallucis,* which runs along the metatarſal bone of the great toe.

The TIBIALIS POSTICA paſſes along the back part of the tibia, goes round the inner ankle, and divides at the heel into the two plantar arteries. In this courſe it ſends off—

1. *A. nutritia tibiæ,* which gives branches to the popliteus, ſoleus, and tibialis anticus muſcles, before it enters the bone.

2. *Many ſmall branches,* as it paſſes downwards.

3. *A. plantaris interna,* which runs along the inner edge of the ſole of the foot, and ſends off *four branches* about the foot.

4. *A. plantaris interna,* which forms an arch and inoſculates with the anterior tibial artery, and gives off the *digital branches* to the toes.

PULMONARY ARTERY.

The *pulmonary artery* ariſes from the right ventricle of the heart, and conveys the dark-coloured blood into the lungs, which is returned to the heart, of a florid colour, by the veins. It does not convey this blood into the lungs for their nutrition, but to receive from the air in the lungs a *certain principle,* neceſſary for the continuance of life, and which the arterial blood diſtributes to every part of the body. The pulmonary artery ſoon divides into a *right* and *left*;—the right going to the right lung, and the left to the left lung; where they divide into innumerable ramifications, and form a beautiful *net-work,* or *plexus of veſſels,* upon the air veſicles, and then terminate in the pulmonary veins, which convey the blood, now become florid, to the left ſide of the heart.

The pulmonary artery ſeldom becomes oſſified; and is very rarely attacked with aneuriſm. One caſe, however, of aneuriſm of the pulmonary artery, the author has ſeen, which was of the ſize of his fiſt.

OF THE ACTION OF THE ARTERIES.

The arteries, by the impulſe of the blood from the ventricles of the heart, are dilated and irritated, and by means of their muſcular coat contract upon the blood, and thus propel it to the glands, muſcles, bones, membranes, and every part of the body, for their nutrition and the various ſecretions; and then into the veins. This dilatation and contraction is called the PULSE, which is perceptible in the trunks and branches of the arteries, but not in the capillary veſſels, except when inflammation is going on.

DISEASED APPEARANCES OF THE ARTERIES.

The diſeaſes of arteries, which are detected by the anatomiſt *poſt mortem*, are, aneuriſm, white patches, oſſification, inflammation, and redneſs of the internal membrane.

OF VEINS.

Veins are membranous canals which do not pulſate; they gradually become larger as they advance towards the heart, in which they terminate, and bring back the blood from the arteries.

ORIGIN. From the extremities of the arteries by anaſtomoſis.

TERMINATION of all the veins is into the auricles of the heart.

DIVISION. Into trunks, branches, ramuli, &c.

SITUATION. They run by the ſides of arteries, but more ſuperficially.

Composed, like arteries, of three membranes, but which are ſemi-tranſparent, and more delicate.

Valves are thin ſemi-lunar membranous folds, which prevent the *return* of the blood in the vein.

The blood is returned from every part of the body into the right auricle:—the vena cava ſuperior receives it from the head, neck, thorax, and ſuperior extremities; the vena cava inferior, from the abdomen and inferior extremities; and the coronary vein receives it from the coronary arteries of the heart.

THE VENA CAVA SUPERIOR.

This vein terminates in the ſuperior part of the right auricle, into which it evacuates the blood from

The *right* and *left ſubclavian veins*, and the *vena azygos.*

The right and left ſubclavian veins receive the blood from the head and upper extremities, in the following manner:

The veins of the fingers, called *digitals*, receive their blood from the digital arteries, and empty it into—

1. The *cephalic of the thumb*, which runs on the back of the hand along the thumb, and evacuates itſelf into the external radial.

2. The *ſalvatella*, which runs along the little finger, unites with the former, and empties its blood into the internal and external cubital veins. At the bend of the fore-arm are three veins, called the great cephalic, the baſilic, and the median.

This vein, the *ſalvatella*, is frequently opened to take away blood; the hand ſhould be ſoaked for ſome time before in warm water, and a ligature put round the wriſt.

The great cephalic runs along the ſuperior part of the fore-arm, and receives the blood from the external radial.

The baſilic aſcends on the under ſide, and receives the blood from the external and internal *cubital veins*, and ſome branches which accompany the brachial artery, called *venæ ſatellitum*.

The MEDIAN is ſituated in the middle of the fore-arm, and ariſes from the union of ſeveral branches.

Either of theſe veins may be opened with the greateſt eaſe; and it is at the bend of the arm that blood is moſt frequently taken from one of theſe branches.

Thrombus is nothing more than ſome blood that has eſcaped into the cellular membrane ſurrounding the vein which is opened;—a mere ecchymoſis, or extravaſation.

When the lancet penetrates the vein, and perforates the artery which lies underneath at the ſame time, the arterial blood ruſhes into the vein. This communication between the artery and vein continues ever after, and the vein becomes dilated and ſerpentine, from the continual influx of the blood from the artery: and this conſtitutes what is called a *varicoſe aneuriſm*.

Theſe three veins all unite above the bend of the arm, and form—

The BRACHIAL VEIN, which receives all their blood, and is continued into the axilla, where it is called

The AXILLARY VEIN. This receives alſo the blood from the ſcapula, and ſuperior and inferior parts of the cheſt, by the *ſuperior* and *inferior thoracic vein*, the *vena muſcularis*, and the *ſcapularis*.

The axillary vein then paſſes under the clavicle, where it is called the SUBCLAVIAN, which unites with the external and internal jugular veins, and the vertebral vein which brings the blood from the vertebral ſinuſes; it receives alſo the blood from the *mediaſtinal*, *pericardiac*, *diaphragmatic*, *thymic*, *internal mammary* and *laryngeal* veins; and then unites with its fellow, to form the vena cava ſuperior, or, as it is ſometimes called, *vena cava deſcendens*.

The blood from the external and internal parts of the head and face is returned in the following manner into the external and internal jugulars, which terminate in the ſubclavians.

The *frontal*, *angular*, *temporal*, *auricular*, *ſublingual*, and *occipital* veins receive the blood from the parts after which they are named; theſe all converge to each ſide of the neck, and form a trunk, called the EXTERNAL JUGULAR VEIN.

> The external jugular may be opened with more facility than the veins in the arm. In ophthalmias it gives ſpeedier and more certain relief, and in many diſeaſes of the head is preferable to taking blood from the arm. The application of a bandage under the arm is uſeleſs; ſimple preſſure with the finger is far better.

The blood from the brain, cerebellum, medulla oblongata, and membranes of theſe parts, is received into the lateral ſinuſes, or veins of the dura mater, one of which empties its blood through the foramen lacerum in baſi cranii into the INTERNAL JUGULAR, which deſcends in the neck by the carotid arteries, receives the blood from the *thyroideal* and *internal maxillary veins*, and empties itſelf into the ſubclavians within the thorax.

The vena azygos receives the blood from the *bronchial*, *ſuperior œſophageal*, *vertebral*, and *intercoſtal veins*, and empties it into the ſuperior cava.

VENA CAVA INFERIOR.

The vena cava inferior is the trunk of all the abdominal veins, and thoſe of the lower extremities, from which parts the blood is returned in the following manner:

The veins of the toes, called the *digital veins*, receive the blood from the digital arteries, and form on the back of the foot three branches, one on the great toe, called the *cephalic*; another, which runs along the little toe, called the *vena ſaphena*; and one on the back of the foot, *vena dorſalis pedis*; and on the ſole of the foot they evacuate themſelves into the *plantar veins*.

The three veins in the upper part of the foot coming together above the ankle, form the *anterior tibial*; and the plantar veins, with a branch from the calf of the leg, called the *ſural vein*, form the *poſterior tibial*; a branch alſo aſcends in the direction of the fibula, called the *peroneal vein*. Theſe three branches unite before the ham, into one branch, the *ſub-popliteal vein*, which aſcends through the ham, carrying all the blood from the foot; it then proceeds upon the anterior part of the thigh, where it is termed the *crural* or *femoral vein*, receives ſeveral muſcular branches, and paſſes under Poupart's ligament into the cavity of the pelvis, where it is called the EXTERNAL ILIAC.

> The veins of the leg and thigh are more frequently found in a varicoſe ſtate than any other veins, eſpecially in females.

The arteries which are diſtributed about the pelvis evacuate their blood into the *external hæmorrhoidal veins*, the *hypogaſtric veins*, the *internal pudendal*, the *vena magna ipſius penis*, and *obturatory veins*, all of which unite in the pelvis, and form the INTERNAL ILIAC VEIN.

The external iliac vein receives the blood from the external pudendal veins, and then unites with the internal iliac at the laſt vertebra of the loins, and forms the VENA CAVA INFERIOR, or ASCENDENS, which aſcends on the right ſide of the ſpine, receiving the blood from the *ſacral*, *lumbar*, *right ſper-*

matic veins, and the *vena cava hepatica*; and, having arrived at the diaphragm, it paſſes through the right foramen, and enters the right auricle of the heart, into which it evacuates all the blood from the abdominal viſcera and lower extremities.

The vena cava inferior at its very commencement has been found morbidly diſtended, and filled with a coagulum; as in aneuriſm of the arteries.

VENÆ CAVÆ HEPATICÆ.

Theſe veins ramify in the ſubſtance of the liver, and bring the blood into the vena cava inferior from the branches of the

VENA PORTÆ.

A great vein which carries the blood from the abdominal viſcera into the ſubſtance of the liver. The trunk of this vein, about the fiſſure of the liver, in which it is ſituated, is *divided* into the hepatic and abdominal portions. The *abdominal portion* is compoſed of the *ſplenic*, *meſeraic*, and *internal hæmorrhoidal veins*. Theſe three venous branches carry all the blood from the ſtomach, ſpleen, pancreas, omentum, meſentery, gall bladder, and the ſmall and large inteſtines, into the *ſinus* of the vena portæ. The *hepatic portion* of the vena portæ enters the ſubſtance of the liver, divides into innumerable ramifications, which ſecrete the bile, and the ſuperfluous blood paſſes into correſponding branches of the *vena cavæ hepaticæ*.

DISEASED APPEARANCES OF THE VEINS.

Theſe are, redneſs of the internal membrane, aneuriſm, obliteration, air in the veins, varix, and abſceſs.

THE ACTION OF THE VEINS.

Veins do not pulſate; the blood which they receive from the arteries flows through them very ſlowly, and is conveyed to the right auricle of the heart, by the contractility of their coats, the preſſure of the blood from the arteries, called the *vis à tergo*, the contraction of the muſcles, and reſpiration; and it is prevented from returning back in the vein by the valves, of which there are a great number.

OF THE ABSORBENTS.

Abſorbents are very thin and pellucid veſſels, which carry the lymph from every part of the body; ſubſtances applied to the ſurface of the body, and the chyle from the inteſtines, into the thoracic duct.

Division. Into *lacteals* and *lymphatics*. They are called *lacteals* in the inteſtines and meſentery, and *lymphatics* in every other part.

Figure. Branching, becoming broader as they proceed towards their termination.

Valves. Numerous, giving them a knotted appearance.

Situation. It is ſuppoſed that they exiſt in every part of the body, although they have not been as yet detected in ſome, as the brain, &c.

Origin. The cellular membrane, the viſcera, the excretory ducts of the viſcera, the external ſurface and every part of the body.

Termination. In the thoracic duct, or ſubclavian vein. The ancient opinion of lymphatics terminating in neighbouring veins, is now juſtly exploded, and ſupported only by the *ipſe dixit* of a few.

Lymphatic or conglobate glands are ſituated every where in the courſe of the lymphatics.

Substance. They conſiſt of tender, pellucid, ſtrong tunics.

The use of the *abſorbents* is to carry back the lymph from different parts; to convey the chyle from the inteſtines to the thoracic duct, where they become mixed and diluted; and to abſorb ſubſtances from ſurfaces and parts on which they originate.

ABSORBENTS OF THE HEAD AND NECK.

Abſorbents are found on the ſcalp and about the viſcera of the neck, which unite into a conſiderable *branch* that accompanies the jugular vein. Abſorbents have not been detected in the human brain; yet there can be no doubt of there being ſuch veſſels. It is probable that they paſs out of the cranium through the *canalis caroticus* and *foramen lacerum in baſi cranii*, on each ſide, and join the above *jugular branch*, which paſſes through ſome glands as it proceeds into the cheſt to the angle of the ſubclavian and jugular vein.

ABSORBENTS OF THE UPPER EXTREMITIES.

The abſorbents of the upper extremities are divided into ſuperficial and deep-ſeated. The *ſuperficial abſorbents* aſcend under the ſkin in every direction to the wriſt, from whence a *branch* proceeds upon the poſterior ſurface of the fore-arm to the head of the radius, over the internal condyle of the humerus, up to the axilla, receiving ſeveral branches as it proceeds. Another *branch* proceeds from the wriſt along the anterior part of the fore-arm, and forms a *net-work*, with a *branch* coming over the ulna from the poſterior part, and aſcends on the inſide of the humerus to the glands of the axilla.

The *deep-ſeated abſorbents* accompany the larger blood-veſſels, and paſs through two glands about the middle of the humerus, and aſcend to the glands of the axilla. The ſuperficial and deep-ſeated abſorbents having paſſed through the axillary glands, form *two trunks*, which unite into *one*, to be inſerted with the jugular abſorbents into the thoracic duct, at the angle formed by the union of the ſubclavian with the jugular vein.

ABSORBENTS OF THE INFERIOR EXTREMITIES.

Theſe are alſo ſuperficial and deep-ſeated. The *ſuperficial ones* lie between the ſkin and muſcles. Thoſe of the toes and foot form a *branch*, which aſcends upon the back of the foot over the tendon of the cruræus anticus, forms, with other branches, a *plexus* above the ankles, then proceeds along the tibia over the knee, ſometimes paſſes through a gland, and proceeds up the inſide of the thigh to the ſubinguinal glands.

The *deep-ſeated* abſorbents follow the courſe of the arteries, and accompany the femoral artery, in which courſe they paſs through ſome glands in the leg and above the knee, and then proceed to ſome deep-ſeated ſubinguinal glands.

The abſorbents from about the external parts of the pubis, as the penis, perinæum, and from the external parts of the pelvis, in general proceed to the inguinal glands. The ſubinguinal and inguinal glands ſend forth ſeveral branches, which paſs through the abdominal ring into the cavity of the abdomen.

ABSORBENTS OF THE ABDOMINAL AND THORACIC VISCERA.

The abſorbents of the lower extremities accompany the external iliac artery, where they are joined by many branches from the *uterus*, *urinary bladder*, *ſpermatic cord*, and ſome branches accompanying the internal iliac artery: they then aſcend to the ſacrum, where they form a *plexus*, which proceeds over the pſoas muſcles, and meeting with the lacteals of the meſentery form the *receptaculum chyli*, which, in adults, is about the ſize of a large pea, and is the commencement of the

THORACIC DUCT.

The thoracic duct, or trunk of the abſorbents, is of a ſerpentine form, about the ſize of a crow-quill, and runs up the dorſal vertebræ, through the poſterior opening of the diaphragm, between the aorta and vena azygos, to the angle formed by the union of the ſubclavian and jugular veins. In this courſe it receives—

The *abſorbents of the kidnies*, which are ſuperficial and deep-ſeated, and unite as they proceed towards the thoracic duct.

The *abſorbents of the ſpleen*, which are upon its peritoneal coat, and unite with thoſe of the pancreas.

A *branch* from a plexus of veſſels paſſing above and below the duodenum, and formed by the abſorbents of the *ſtomach*, which come from the leſſer and greater curvature, and are united about the pylorus with thoſe of the pancreas and *liver*, which converge from the external ſurface and internal parts towards the porta of the liver, and alſo by ſeveral branches from the *gall-bladder*.

The abſorbents of the *diaphragm*, *pleura*, *lungs*, *heart*, and *pericardium*.

The *lacteals* are conſidered in Splanchnology.

DISEASED APPEARANCES.

Lymphatics morbidly diſtended with lymph—inflammation of the lymphatics—ſcrophulous thickening of the coats of the lymphatics—cancerous thickening of the coats of the lymphatics—lymphatics enlarged and filled with ſcrophulous or ſebacious matter.

PHYSIOLOGY OF ABSORPTION.

Abſorption is the taking up of ſubſtances which are applied to the mouths of abſorbing veſſels; thus the chyle is abſorbed from the inteſtinal tube by the lacteals, the vapour of circumſcribed cavities, and of the cells of the cellular membrane by the lymphatics of thoſe parts; and thus mercury and other ſubſtances are taken into the ſyſtem, when rubbed on the ſkin.

The principle by which this abſorption takes place is a power inherent in the mouths of abſorbing veſſels, a vis inſita, dependent on the high degree of irritability of their internal membrane, by which the veſſels contract and propel the fluid forwards. Hence the uſe of this function appears to be of the utmoſt importance, viz. to ſupply the blood with chyle; to remove the ſuperfluous vapour of circumſcribed cavities; otherwiſe dropſies, as hydrocephalus, hydrothorax, hydrocordis, aſcites, hydrocele, &c. would conſtantly be taking place; to remove the ſuperfluous vapour from the cells of the cellular membrane diſperſed throughout every part of the body, that anaſarca may not take place; to remove the hard and ſoft parts of the body; and to convey into the ſyſtem medicines which are applied to the ſurface of the body.

SANGUIFICATION.

Sanguification appears to be nothing more than the mixing, by the action of the blood-veſſels, of the chyle with the blood; for as it paſſes from the ſubclavian vein, it changes its colour, and, when it has reached the heart, cannot be diſtinguiſhed from the maſs of circulating blood.

NEUROLOGY;

OR,

DOCTRINE OF THE NERVES.

Nerves are long, whitiſh, pulpy cords, compoſed of bundles or faſciculi of fibres, which ſerve for ſenſation.

Origin. The cerebrum, cerebellum, medulla oblongata, and medulla ſpinalis. Thoſe which ariſe from the cerebrum, cerebellum, and medulla oblongata, are termed *cerebral nerves*; and thoſe from the ſpinal marrow, *ſpinal nerves.* All the other nerves of the body ariſe from theſe.

Termination. The organs of ſenſe, viſcera, veſſels, muſcles, bones, &c.

Division. Into trunks, branches, ramuli, capillary fibres, papillæ, nervous plexuſes, and ganglions, or knots.

Number. Thirty-nine pair;—nine pair of cerebral nerves, and thirty pair of ſpinal. The *nine pair of cerebral nerves* are, 1. The olfactory. 2. The optic. 3. Oculorum motorii. 4. The pathetic, or trochleatores. 5. The trigemini, or diviſi. 6. The abducent. 7. The auditory and facial. 8. The par vagum, or great ſympathetic nerves. 9. The lingual pair.

The *thirty pair of ſpinal nerves* are divided into eight pair of cervical, twelve pair of dorſal, five pair of lumbar, and five pair of ſacral nerves.

All the cerebral and ſpinal nerves are covered at their origin by the pia mater, and at their egreſs from the ſkull and ſpine by the dura mater, which laſt conſtitutes the vagina of the nerve, in the form of a firm cellular texture, but when the nerve arrives at its place of deſtination, where it appears in a ſoft pulpy ſtate.

The *ganglions*, or knots of nerves, are whitiſh red bodies, of various ſize and figure, ſomewhat harder than a nerve found in the courſe of many of the nerves. They conſiſt of medullary and fibrous ſubſtance: their uſe is not known.

When nerves are woven together like a net, they form a *plexus:* theſe are common about the abdominal viſcera.

Use. Nerves are the organs of ſenſation, conſtituting the organs of the five external ſenſes,—touch, ſight, hearing, ſmelling, and taſte; nor can the motion of muſcles be performed without the nervous influence.

OF THE NERVES OF THE BRAIN.

The first pair, or *olfactory nerves*, ariſe from the corpora ſtriata, in a triangular form; paſs forwards, becoming flatter, over the ſphænoid and frontal bones, one to each ſide of the criſta galli, where they are flattened and enlarged, and ſend down a number of branches, which go through the cribriform foramen of the ethmoid bone, to be diſtributed on the pituitary membrane of the noſe.

Use. They form the organ of ſmelling on the pituitary membrane of the noſe.

A want of energy in theſe nerves gives riſe to *anoſmia*, or want of ſmell, which is moſtly ſymptomatic.

The SECOND PAIR, or *optic nerves*, ariſe from the thalami nervorum opticorum, turn round the crura cerebri, becoming thinner, decuſſate each other, or are united together, then paſs through the foramina optica, and perforate the bulb of the eye, and in it form the *retina*.

> The optic nerves being the organs of ſight, moſt of their diſeaſes produce blindneſs. A diſeaſed appearance, conſiſting of a change of colour into a brown, and a pulpineſs, have been ſometimes noticed about the junction of theſe nerves.

The THIRD PAIR, or *oculorum motorii*, ariſe from the crura cerebri, near the pons Varolii, paſs fowards towards the top of the petrous portion of the temporal bone, where they perforate the dura mater, and proceed to the orbital fiſſure, to be inſerted into the muſcles of the bulb of the eye, which they move. There is ſometimes a branch given off from this nerve to join a branch of the fifth pair in the orbit, and form a ganglion, which is termed the *lenticular* or *ophthalmic ganglion*, from whence ſmall branches proceed to the choroid membrane of the eye, the iris, uvea, and tunica ſclerotica.

The FOURTH PAIR, or the *pathetic nerves*, ariſe from the crura of the cerebellum laterally, paſs forward, and pierce the dura mater below the third pair, and proceed with them through the orbital fiſſure to be inſerted into the trochlearis muſcle of the eye.

The FIFTH PAIR, or *trigemini*, ariſe from the anterior part of the crura of the cerebellum, and are divided within the cavity of the cranium into three branches, viz. the ophthalmic or orbital, and the ſuperior and inferior maxillary.

The *orbital* nerve gives off a *branch*, near its origin, which unites with a branch of the ſixth pair, to form the great intercoſtal nerve; it then divides into three branches:

1. The *frontal*, which goes through the ſuperciliary foramen to the muſcles and integuments of the forehead.

2. The *lachrymal*, which goes to the lachrymal gland.

3. The *naſal*, which goes forwards to the inner canthus of the eye, where it gives off a branch or two, then returns into the cranium, and paſſes through the cribriform plate of the ethmoid bone, and is diſtributed on the pituitary membrane.

The *ſuperior maxillary* nerve goes through the foramen rotundum, and is divided into—

1. The *ſphæno-palatine*, which goes through the ſphænopalatine foramen, ſends twigs to the internal pterygoid muſcle, then enters the cavity of the noſtrils, and is loſt on the Euſtachian tube, ſoft palate, and pituitary ſinus of the ſphænoid bone.

2. The *poſterior alveolar* branch, which deſcends through the foramen by the laſt grinder, and is diſtributed to the molares.

3. The *infra-orbital* nerve, which goes through the infraorbital foramen, and is diſtributed on the muſcles of the cheek, noſe, lips, and communicates with the facial nerve.

The *inferior maxillary* goes out of the cranium, through the foramen ovale, giving branches to the muſcles and glands in its courſe, and to the facial nerve, and divides as it paſſes over the pterygoid muſcle, into—

1. The *internal lingual*, which is connected with the chorda tympani, and ſupplies the ſublingual glands and contiguous muſcles, but more eſpecially the tongue.

2. The more proper *inferior maxillary*, which goes into the canalis mentalis of the lower jaw, gives a branch to each tooth, and comes out again to ſupply the lower lip and chin.

The diſtributions of the fifth pair of nerves on the face are ſubject to a peculiar diſeaſe, the *tic douloureux*, which is occaſionally relieved by dividing the nerves, and, hitherto, by no other means.

The SIXTH PAIR, or *abducent nerves*, ariſe from the poſterior part of the pons Varolii, proceed forwards, perforate the dura mater, and ſend off ſome branches near the ſella turcica, which unite with branches of the ophthalmic nerve of the fifth pair, to form the great intercoſtal nerve; they then accompany the third and fourth pair through the orbital fiſſure, and are diſtributed on the recti externi muſcles of the bulb of the eye.

The SEVENTH PAIR, or *auditory nerves*, as they are commonly called, originate on each ſide by two branches, the portio dura and portio mollis.

The *portio dura* is, in fact, a nerve of the face, and is therefore, with more propriety, called the *facial nerve:* it ariſes from the fourth ventricle of the brain, paſſes through the petrous portion of the temporal bone, where it gives off the *chorda tympani*, proceeds through the ſtylo-maſtoid foramen, perforates the parotid gland, and then divides into ſeven or eight branches, which conſtitute the *pes anſerinus*, ſupply the ear, parotid gland, and muſcles of the face, and communicate with the branches of the fifth pair on the face.

The *portio mollis*, or auditory nerve, ariſes from the medulla oblongata and the fourth ventricle, enters the internal auditory paſſage, and is diſtributed by innumerable branches on the membrane of the cochlea, veſtibulum, forming the immediate organ of hearing.

The EIGHTH PAIR, or *par vagum*, ariſe by ſeveral branches, partly from the medulla oblongata, and partly from the fourth ventricle behind the pons Varolii. It is connected at its origin with the *acceſſory nerves of Willis*, which aſcend through the great occipital foramen from the fifth cervical nerve. theſe nerves proceed together through the foramen lacerum in baſi cranii. The acceſſory nerves then ſeparate from the par vagum, and vaniſh in the ſterno-cleido-maſtoideus and cucullaris muſcles: the par vagum then gives off branches in the neck to the tongue, larynx, and thyroid gland, from which parts they acquire names, and then deſcends into the cavity of the thorax, where it gives off—

1. The *right* and *left recurrent:* the former ariſes on the right ſide, near the ſubclavian artery, which it ſurrounds, and then returns upwards to the thyroid gland: the latter ariſes under the arch of the aorta, which it ſurrounds, and then aſcends to the œſophagus. Both nerves are loſt in the muſcles of the larynx and pharynx.

2. *Several branches* which proceed to the ſuperior part of the pericardium, to form with other nerves the *cardiac plexus*, which ſends branches to the heart.

3. The par vagum then extends on the poſterior ſurface of the lungs, on each ſide, and gives off ſome *branches*, which, with others from the cardiac plexus and recurrent nerves, form a *right* and *left pulmonic plexus*, which ſupplies the lungs and trachea.

4. Both trunks of the par vagum then deſcend with the œſophagus, and give off many *ramifications*, which form the *œſophageal plexus*, from which the œſophagus and adjoining parts are ſupplied.

5. Having paſſed the diaphragm with the œſophagus, they form, about the cardia, two *ſtomachic plexuſes:* the anterior is expanded over the anterior ſurface of the ſtomach, and its greater curvature; the poſterior over the poſterior ſurface and leſſer curvature, and it tranſmits alſo branches to the liver, pancreas, and diaphragm.

6. The par vagum alſo ſends ſome *branches* to unite with the

great intercoſtal, and thus concurs in forming the *hepatic*, *ſplenic*, and *renal plexuſes.*

The NINTH, or *lingual pair* of nerves, ariſe from the medulla oblongata, between the corpora olivaria and pyramidalia, paſs out of the ſkull through the foramina condyloidea anteriora, and communicate with the par vagum and firſt pair of cervical nerves; they then proceed forwards between the jugular vein and carotid artery, to be diſtributed on the muſcles of the tongue and os hyoides.

Thus it appears that the olfactory, ophthalmic, and oculorum motorii ariſe from the cerebrum; the trochleatores and trigemini from the cerebellum; and the auditory, par vagum, and linguales, from the medulla oblongata.

OF THE NERVES OF THE MEDULLA SPINALIS.

Thoſe nerves are called *ſpinal* which paſs out through the lateral or intervertebral foramina of the ſpine.

Each nerve ariſes by two twigs, which unite and form a ſmall ganglion before the nerve leaves the vertebral canal. They all receive a covering from the dura and pia mater, which accompanies them to their ultimate terminations.

The ſpinal nerves are divided into *cervical*, *dorſal*, *lumbar*, and *ſacral* nerves.

CERVICAL NERVES.

The *cervical* nerves are *eight* pairs, and are to be diſtinguiſhed from the nerves which paſs from the brain along the neck.

The *firſt* are called the *occipital*; they ariſe from the beginning of the ſpinal marrow, paſs out between the margin of the occipital foramen and atlas, form a ganglion on its tranſverſe proceſs, and are diſtributed about the occiput and neck.

The *ſecond* pair of cervical nerves ſend a branch to the acceſſory nerve of Willis, and proceed to the parotid gland and external ear.

The *third* cervical pair ſupply the integuments of the ſcapula, cucullaris, and triangularis muſcles, and ſend a branch to aſſiſt in forming the diaphragmatic nerve.

The *fourth pair* ſend off two branches; one to unite with branches from the ſecond and fifth cervical pairs, and this union forms the acceſſory nerve of Willis; the other to unite with a branch from the third and fifth cervical, which forms the diaphragmatic nerve.

The *fourth, fifth, ſixth, ſeventh*, and *eighth* pairs all converge to form the *brachial plexus*, from which ariſe the acceſſory nerves of Willis, the diaphragmatic nerve, and the nerves of the upper extremities, which are therefore to be conſidered here.

ACCESSORY NERVE OF WILLIS.

This ariſes on both ſides of the neck from the union of branches from the ſecond, fourth, and fifth pairs, proceeds upwards through the great occipital foramen to the medulla oblongata, where it joins the par vagum, and accompanies it out of the ſkull, through the foramen lacerum in baſi cranii, and then leaves it to be diſtributed on the cucullaris and ſterno-cleido-maſtoideus muſcles.

DIAPHRAGMATIC NERVE.

The diaphragmatic nerve, which is alſo called the *phrenic* nerve, is formed in the neck by the union of the branches from the third, fourth, and fifth cervical pairs, and by a branch coming from the firſt pair of dorſal nerves, and another from the great intercoſtal. From the neck it paſſes between the clavicle and ſubclavian artery into the thorax, and deſcends along the pericardium to the upper ſurface of the diaphragm, where it divides into numberleſs branches, which are loſt in its ſubſtance.

NERVES OF THE UPPER EXTREMITIES.

All the nerves of the upper extremities ariſe from the *brachial plexus*, ſituated in the neck, which is chiefly conſtituted by the union of the five lowermoſt cervical nerves, and a large branch of the firſt pair of the back. Several ſmall branches firſt are given off to contiguous parts, and then—

1. The *axillary* nerve, which ſometimes ariſes from the radial nerve. It runs backwards and outwards around the neck of the humerus, and ramifies in the muſcles of the ſcapula.

2. The *external cutaneal*, which perforates the coracobrachialis muſcle, to the bend of the arm, where it accompanies the median vein as far as the thumb, and it is loſt in its integuments.

3. The *internal cutaneal*, which deſcends on the inſide of the arm, where it biſurcates. From the bend of the arm, the anterior branch accompanies the baſilic vein, to be inſerted into the ſkin of the palm of the hand; the poſterior branch runs down the internal part of the fore-arm, to vaniſh in the ſkin of the little finger.

4. The *median nerve*, which accompanies the brachial artery to the cubit, then paſſes between the brachialis internus, pronator rotundus, and the perforatus and perforans, under the ligament of the wriſt to the palm of the hand, where it ſends off branches in every direction to the muſcles of the hand, and then ſupplies the *digital nerves*, which go to the extremities of the thumb, fore and middle fingers.

5. The *ulnar nerve*, which deſcends between the brachial artery and baſilic vein, between the internal condyle of the

humerus, and the olecranon, and divides in the fore-arm into an *internal* and an *external* branch. The former paſſes over the ligament of the wriſt and ſeſamoid bone, to the hand, where it divides into three branches, two of which go to the ring and little finger, and the third forms an arch towards the thumb in the palm of the hand, and is loſt in the contiguous muſcles. The latter paſſes over the tendon of the extenſor carpi ulnaris, and back of the hand, to ſupply alſo the two laſt fingers.

6. The *radial nerve*, which ſometimes gives off the axillary nerve. It paſſes backwards, about the os humeri, deſcends on the outſide of the arm, between the brachialis externus and internus muſcles to the cubit; then proceeds between the ſupinator longus and brevis to the ſuperior extremity of the radius, giving off various branches to adjacent muſcles. At this place it divides into two branches; one goes along the radius, between the ſupinator longus and radialis internus, to the back of the hand, and terminates in the interoſſeous muſcles, the thumb, and three firſt fingers; the other paſſes between the ſupinator brevis and head of the radius, and is loſt in the muſcles of the fore-arm.

DORSAL NERVES.

The *dorſal nerves* are twelve pairs in number. The *firſt* pair gives off a branch to the brachial plexus. All the dorſal nerves are diſtributed to the muſcles of the back, intercoſtals, ſerrati, pectoral, abdominal muſcles and diaphragm. The five inferior pairs go to the cartilages of the ribs, and are called *coſtal*.

LUMBAR NERVES.

The five pair of *lumbar nerves* are beſtowed about the loins and its muſcles, the ſkin of the abdomen and loins, ſcrotum, ovaria, and diaphragm. The ſecond, third, and fifth pair unite and form the *obturator nerve*, which deſcends over the pſoas muſcle into the pelvis, and paſſes through the foramen thyroideum to the obturator muſcle, triceps, pectineus, &c.

The third and fourth, with ſome branches of the ſecond pair, form the *crural nerve*, which paſſes under Poupart's ligament with the femoral artery, ſends off branches to the adjacent parts, and deſcends in the direction of the ſartorius muſcle to the internal condyle of the femur, from whence it accompanies the ſaphena vein to the internal ankle, to be loſt in the ſkin of the great toe.

The fifth pair are joined to the firſt pair of the ſacral nerves.

SACRAL NERVES.

There are five pair of *ſacral nerves*, all of which ariſe from the *cauda equina*, or termination of the medulla ſpinalis; ſo called from the nerves reſembling the tail of a horſe. The four firſt pair give off branches to the pelvic viſcera, and are afterwards united to the laſt lumbar, to form a large *plexus*, which gives off—

The *iſchiatic nerve*, the largeſt in the body, which immediately at its origin ſends off branches to the bladder, rectum, and parts of generation; proceeds from the cavity of the pelvis through the iſchiatic notch, between the tuberoſity of the iſchium and great trochanter, to the ham, where it is called the *popliteal nerve*. In the ham it divides into two branches:

1. The *peroneal*, which deſcends on the tibula, and diſtributes many branches to the muſcles of the leg and back of the foot.

2. The *tibial*, which penetrates the gaſtrocnemii muſcles to the internal ankle, paſſes through a notch in the os calcis to the ſole of the foot, where it divides into an *internal* and *external*

plantar nerve, which ſupply the muſcles and aponeuroſis of the foot and the toes.

THE GREAT INTERCOSTAL NERVES.

The great intercoſtal or ſympathetic nerve ariſes in the cavity of the cranium from the union of a branch of the ſixth with a recurrent twig of the ſecond branch of the fifth pair. It paſſes out of the cranium through the carotid canal, and deſcends on the ſides of the cervical, dorſal, and lumbar vertebræ and ſacrum, in which courſe it is joined by filaments from all the ſpinal nerves, forming ſmall ganglions at their junctions.

In the neck it forms only three *ganglions*, which are called *cervical.*

1. The *uppermoſt* is ſituated upon the ſecond vertebra behind the pharynx; it ſends branches which concur in forming the pulmonic and cardiac plexuſes; and ſeveral other twigs, which unite with the lingual nerve, the par vagum, and the two other ganglions.

2. The *middle ganglion*, which is ſituated on the fourth cervical vertebra.

3. The *lowermoſt ganglion*, which is the leaſt, and placed on the laſt cervical vertebra. The branch goes off from it, and ſurrounds the ſubclavian artery and ſeveral others, which unite with other branches from the par vagum, and form the *cardiac plexus.*

The trunk of the great intercoſtal then deſcends behind the ſubclavian artery by the ſides of the tranſverſe proceſſes of the dorſal vertebræ, through the cavity of the cheſt, receiving two branches from each of the dorſal nerves coming from the ſpinal marrow, as it paſſes along, and forming as many ſmall ganglions. It then quits the ſide of the vertebræ, accompanies the aorta, and having reached the ſacrum, it produces ſeveral ganglions, with the ſpinal branches coming from this part; and, laſtly, the great intercoſtal is reflected inwards about the os coccygis, and joins its fellow of the oppoſite ſide. Having thus deſcribed the courſe of this nerve, ſo juſtly termed the great ſympathetic, it ſtill remains to enumerate the ſeveral abdominal plexuſes which ariſe from it,—for the viſcera of the abdomen are all ſupplied from the great intercoſtal.

The fifth dorſal ganglion of the intercoſtal ſends off a nerve into the thorax; the third dorſal ganglion alſo ſends off a nerve; a nerve proceeds from the ſeventh dorſal ganglion; one alſo goes from the eighth ganglion; and another nerve is given off from the ninth and tenth, or ſometimes from the eleventh dorſal ganglion. Theſe five branches, given off by the *dorſal ganglia*, deſcend in the thorax in the courſe of the vertebræ, and paſs through the diaphragm into the abdomen, where they all unite into one trunk on each ſide; and this nerve is called the *ſplanchnic*, or *little*, or anterior intercoſtal.

The ſplanchnic intercoſtal nerve proceeds a very little way from the diaphragm before it produces a large ganglion on the anterior part of the aorta: this ganglion is of a ſemilunar form, and termed the *ſemilunar ganglion*; ſome ſmall twigs paſs a little from it, and form net-work, which is termed the *ſolar plexus*. The two ſemilunar ganglia ſend ſeveral branches to unite with and form the other abdominal ganglia; thus—

1. The *cœliac plexus*. This ſurrounds the cœliac artery, and is formed by the union of ſeveral branches from the ſolar plexus and ſemilunar ganglion.

2. The *hepatic plexus*. This ariſes from branches given off from the cœliac plexus, uniting with thoſe coming from the ſemilunar ganglion. The hepatic plexus ſupplies the vena

portarum, the gall-bladder, liver, duodenum, and omentum, with nerves.

3. The *ſplenic plexus.* Which ariſes from branches given off from the cœliac plexus and right ſemilunar ganglion; it paſſes with the veſſels into the ſpleen, and ſends branches to the ſtomach and pancreas.

4. The *ſuperior meſenteric plexus.* Formed by the union of ſeveral branches from the ſemilunar and ſolar ganglion, and the former plexuſes. It ſends nerves to the meſentery, meſocolon, and meſenteric glands.

5. The *renal plexus.* Formed by branches of the ſemilunar ganglions, and the ſuperior meſenteric plexus: the kidnies are ſupplied with nerves from this plexus.

6. The *inferior meſenteric plexus.* Situated near the inferior meſenteric artery.

7. The *meſocolic,* or *poſterior meſenteric plexus.* This ariſes from the union of ſeveral nerves ſent over the aorta from the *ſuperior meſenteric* and *renal plexuſes,* and ſupplies the meſentery and inteſtines.

8. The *hypogaſtric plexus.* Branches from the ſuperior and inferior meſenteric plexus form this, which is ſituated at the fourth vertebra of the loins. The hypogaſtric plexus ſoon divides into two branches, in each of which is a ganglion that ſends nerves to the urinary bladder, rectum, and contiguous parts.

9. The *ſpermatic plexus.* Which ſupplies the ſpermatic veſſels, teſtes, ovaria, &c.

DISEASED APPEARANCES OF NERVES.

Although more liable than any other part of the body to diſeaſe, yet they ſeldom preſent the anatomiſt with any morbid appearance, poſt mortem. Thoſe which have been noticed are a general waſting away and a tumour of a nerve. The vagina of a nerve has been found highly inflamed, from a ſpicula of bone irritating it, and producing convulſions and tetanus.

PHYSIOLOGY OF THE FUNCTIONS OF THE NERVOUS SYSTEM.

Nerves are the organs of our ſenſes. Bodies applied to certain parts of our ſyſtem produce changes in thoſe parts, which changes are conveyed in an unknown manner to the brain, by means of the nerves only, and SENSATION is produced; ſo that ſenſation is a property peculiar to the nervous fibre, as irritability is to the muſcular fibre; and hence all ſentient parts are ſupplied with nerves, although they cannot be detected by the eye.

The ſenſes are diſtinguiſhed into internal and external:

The INTERNAL SENSES are ideas which the ſenſorium commune, or mind, forms to itſelf, and may be produced from the external ſenſes, or they may be excited ſpontaneouſly; ſuch are, *memory*, *imagination*, *conſcience*, *the paſſions of the mind*, and *reaſoning*, by the ſuperior excellence of which, man differs ſo eminently from the brute.

The EXTERNAL SENSES are, ſmelling, ſeeing, hearing, taſting, and touching.

SMELLING.

Smelling is a ſenſation by which we perceive the ſmell of ſubſtances.

The *organ* of ſmell is the nervous papillæ of the olfactory or firſt pair of nerves, which are diſtributed on every part of the pituitary membrane of the noſe.

SEEING.

Seeing is a ſenſation by which we perceive bodies around us, and their viſible qualities.

The *organ* of ſight is the retina, an expanſion of the optic or ſecond pair of nerves.

The *object* of ſight is the rays of light, which penetrate the bulb of the eye and ſtimulate the retina.

Light is a ſubtile and ſolid material, which emanates from the ſun or any lucid body with a very rapid motion, in right lines, which are called *rays of light*, and penetrate to the retina in the following manner: the rays of light fall on the pellucid and convex cornea of the eye, by whoſe denſity and convexity they are united into a focus, which paſſes the aqueous humour and pupil of the eye, to be more condenſed by the cryſtalline lens. The rays of light thus concentrated, penetrate the vitreous humour, to ſtimulate the retina, upon which they impreſs the image of external objects to be repreſented to the mind through the medium of the optic nerves.

HEARING.

Hearing is a ſenſation by which we perceive the ſound of any ſonorous body.

Sound is a tremulous motion of the air excited by ſtriking any ſonorous body. Sound is conveyed to an enormous diſtance in the atmoſphere, in ſtraight lines, which are called ſonorous rays. Soft bodies diminiſh or ſtifle ſound; elaſtic ones increaſe it.

The *organ* of hearing is the portio mollis of the ſeventh pair of f nerves, whoſe pulp is beautifully diſtributed upon the *ampullæ* of the membranous ſemicircular canals, the *barbula*, and the *zona mollis* of the cochlea.

Hearing is *performed* in the following manner: the rays of ſound emanating from a ſonorous body arrive at the ear, which, by its elaſticity and peculiar formation, concentrates them, that they may paſs along the external auditory foramen to the membrana tympani, which they cauſe to vibrate. The trembling tympanum communicates its vibrations to the malleus, which is in contact with it: the malleus conveys them to the incus, the incus to the os orbiculare, and the os orbiculare to the ſtapes. The ſtapes adhering to the feneſtra ovalis cauſes it to vibrate. The trembling feneſtra ovalis communicates its vibrations to the water contained in the membranous ſemicircular canals, and to the cochlea, and cauſes very gentle motions of the nervous expanſion of thoſe parts, which tranſmit them to the ſenſorium commune, where the mind is informed of the preſence of ſound, and judges of its difference. Gravity and acuteneſs of ſound depend upon the number of vibrations given at the ſame time.

TASTING.

Taſting is a ſenſation by which we diſtinguiſh the qualities of bitter, ſweet, ſour, &c. ſubſtances.

The nervous papillæ of the ninth or lingual pair of nerves, which are ſituated in the apex and margins of the tongue, are the chief *organs* of taſte.

The parts ſubſervient to taſte are—

1. The *tongue*, which gives a convenient ſituation to the nervous papillæ, and by its extenſive motion applies them to the ſubſtance to be taſted.

2. The *epidermis* of the tongue; which moderates any exceſſive ſtimuli.

3. The *ſaliva* and *mucus* of the mouth, which aſſiſt the organ of taſte when it is neceſſary that the ſubſtance ſhould be diſſolved in order to be taſted, and which alſo keep the nervous papillæ moiſt.

TOUCHING.

Touching is a ſenſation by which we diſtinguiſh the qualities of hardneſs, ſoftneſs, heat and cold, &c. of ſubſtances, and by which we perceive any ſubſtance that comes in contact with the ſkin, particularly at the points of the fingers.

The *organs* of touch are the nervous papillæ of the ſkin, which are extremely numerous and ſenſible at the points of the fingers.

Too great a ſenſation is moderated by the epidermis, which alſo defends the papillæ from being dried by the air.

ADENOLOGY;

OR,

DOCTRINE OF THE GLANDS.

A gland is a ſmall, round, vaſcular body, which ſerves for the ſecretion or alteration of a fluid.

DIVISION. Into folliculoſe, globate, glomerate, and conglomerate; they are alſo divided from the liquid they ſecrete or change, into ſebaceous, muciparous, lymphatic, lachrymal, ſalival, bilious, lacteal, &c.

A *folliculoſe* gland conſiſts of an hollow vaſcular membrane, having an excretory duct; as the muciparous and ſebaceous glands.

A *globate* gland conſiſts of a glomer of lymphatic veſſels, connected together by cellular membrane, and has no cavity nor excretory duct, as the lymphatic glands of the lymphatic veſſels.

A *glomerate* gland is formed of a glomer of ſanguineous veſſels; has no cavity, but is furniſhed with an excretory duct, as the lachrymal and mammary glands.

A *conglomerate* gland is a gland compoſed of many glomerate glands, whoſe excretory ducts unite, and form one large canal or duct. The pancreas and ſalival glands belong to this claſs.

The EXCRETORY DUCT of glands is a thin canal, which goes out of the gland, and excerns the ſecreted fluids by the contractility of its coats.

The *nerves* and *veſſels* of glands are numerous, and, in moſt inſtances, come from the neighbouring parts. Some particular glands are, however, ſupplied with veſſels proper to them, as the viſceral glands, the thyroid, proſtate, &c.

Glands are connected with other parts by cellular membrane. They are larger in infants than in adults.

GLANDS OF THE SKIN.

The *ſubcutaneous glands* are ſebaceous, and ſituated under the ſkin, which they perforate by their excretory ducts.

> Theſe glands are frequently found diſeaſed. A collection of a white ſebaceous ſubſtance in the excretory duct is amongſt the moſt common diſeaſed appearances. It ariſes from a diſeaſed action of the gland ſeparating an unhealthy ſebaceous ſubſtance.
>
> They are frequently found enlarged and inflamed after death, conſtituting the diſeaſes called *phyma* and *furunculus.*

GLANDS IN THE CAVITY OF THE CRANIUM.

1. The *glands of the dura mater*, called alſo, after their diſcoverer, *Pacchionian*, are ſmall fatty ſubſtances, ſituated near the ſuperior longitudinal ſinus of the dura mater, in peculiar foveolæ of the os frontis and parietal bones

> The Pacchionian glands vary very much in their appearance in the dead body. One, which is certainly a diſeaſed appearance, is a general enlargement, which cauſes, in ſome caſes, an abſorption of the ſuperincumbent bone. The nature of theſe fatty or glandular ſubſtances is not known, neither in their natural nor diſeaſed ſtate.

2. The *glands of the choroid plexus*, which are globate, and ſituated in the choroid plexus of the lateral ventricles of the brain.

> The glands of the choroid plexus are ſometimes changed into a white ſubſtance, the ſize of a pin's head, which is hard, and apparently of the nature of ſcirrhus.
>
> Whether the globular veſicles, called hydatids, are diſeaſed appearances of theſe glands, is not aſcertained.

3. The *pituitary gland*, ſituated in a duplicature of the dura mater, in the ſella turcica of the ſphænoid bone. The infundibulum of the brain terminates in this gland.

> The pituitary gland occaſionally is converted into a hard ſubcartilaginous ſtructure; and, it is ſaid, into bone.
>
> It has been completely abſorbed, in conſequence of preſſure from diſeaſe of the brain.

GLANDS OF THE EYES.

1. *Meibomius's glands.* Theſe are ſmall and numerous ſebaceous glands, ſituated under the ſkin of the eyelids, near their

margins. Their excretory ducts open on the margins of the tarſus, and are called *puncta ciliaria.*

> Theſe glands are ſometimes found converted into white ſebaceous ſpots; and this ſtate generally accompanies other marks of ſcrophula in the habit.

2. The *lachrymal gland*, which is glomerate, and ſituated above the external angle of the orbit, in a peculiar depreſſion of the os frontis. This gland has ſix or eight excretory canals, through which the tears are conveyed, and which open upon the internal ſurface of the upper eyelids.

> The lachrymal gland is ſometimes found without the orbit near the external canthus.

3. The *caruncula lachrymalis*, a ſmall and red prominence, obvious in the internal angle of the eye, between the tarſi of the eyelids. It conſiſts of ſmall ſebaceous glands, which ſecrete a fæculent humour.

GLANDS OF THE NOSTRILS.

The pituitary membrane lining the noſtrils and its ſinuſes is every where furniſhed with *muciparous glands*, which ſecrete the mucus of the noſe.

> Inflammation of theſe glands conſtitutes, in conjunction with a ſimilar affection of the membrane itſelf, *catarrh.*

GLANDS OF THE EAR.

The *ceruminous glands* are ſituated under the ſkin of the meatus auditorius externus, and ſecrete the wax of the ears.

GLANDS OF THE MOUTH.

The glands of the mouth, which ſecrete the ſaliva, are called *ſalival*; they are,

1. The *parotids.* Two large conglomerate glands, ſituated one under each ear, between the mamillary proceſs of the temporal bones and angle of the lower jaw. The excretory canal of this gland opens in the mouth, and is called, from its diſcoverer, the *Stenonian* duct.

> The mumps is a particular affection of this gland of an inflammatory nature, and is called *cynanche parotidea*, or *parotis.*

2. The *maxillary.* Which are conglomerate glands, ſituated under the angles of the lower jaw. The excretory ducts of theſe glands are alſo called, after their diſcoverer, *Warthonian.*

> Theſe glands are very frequently affected with ſcrophula.

3. The *ſublingual glands.* Situated under the tongue.

4. The *glands of the cheek*, ſituated on the internal ſurface of the cheeks.

5. The *labial glands*, on the internal ſurface of the lips, under the common membrane of the mouth.

6. The *molar glands*, ſituated on each ſide of the mouth, between the maſſeter and buccinator muſcles. Their excretory ducts open near the laſt dens molaris.

EXTERNAL GLANDS OF THE NECK.

1. The *jugular glands*, which are globate, and found under the ſkin of the neck about the external jugular veins: they are in general about twenty in number.

> Theſe glands are frequently enlarged and ſcrophulous.

2. The *ſubmaxillary glands*, alſo globate, and ſituated in the fat under the jaw.

3. The *cervical*, found under the cutis in the fat about the neck.

4. The *thyroid*. A large gland lying upon the cricoid cartilage, trachea, and horns of the thyroid cartilage. It is uncertain whether it be globate or conglomerate. Its excretory duct has never been detected, and its uſe is unknown.

> The thyroid gland is often the ſeat of *bronchocele*, which is a morbid enlargement, either from a depoſition of adventitious matter, or diſtention from air.

GLANDS OF THE FAUCES.

The glands ſituated under the membrane which lines this cavity, are muciparous, and divided, from their ſituation, into *palatine*, *uvular*, *tonſil*, *lingual*, *laryngeal*, and *pharyngeal*.

> The tonſil glands, which are alſo called the almonds of the ear, are ſubject to inflammation, forming the *cynanche tonſillaris*—ſuppuration—enlargement—ſcirrhus.

GLANDS OF THE BREASTS.

The *mammary*, or *lacteal glands*, are ſituated under the fat of the breaſts. Their excretory ducts are called *tubuli lactiferi*, and *tubuli galactoferi*; they proceed to the nipple, in which they open.

> The tubuli galactoferi are often diſtended with milk, ſo as to induce inflammation of the breaſt.
>
> Inflammation of the breaſt, either of the cellular ſubſtance or glandular part, is called *maſtodynia*, or *maſtitis*.

GLANDS OF THE THORAX.

1. The *thymus*, a large gland, peculiar to the fœtus, and which diſappears ſoon after birth: it is ſituated in the anterior duplicature or ſpace of the mediaſtinum, under the ſuperior part of the ſternum, and above the pericardium. An excretory duct has not been as yet detected, but lymphatics are ſeen going from this gland to the thoracic duct.

2. The *bronchial*, which are large blackiſh glands near the end of the trachea, and beginning of the bronchia, and which ſecrete a blackiſh mucus.

> The bronchial glands are not unfrequently found oſſified.

3. The *œſophageal glands*, found under the internal membrane of the œſophagus, and which ſecrete the mucus of that canal.

4. The *dorſal glands*, ſituated upon the fourth or fifth vertebra of the back, between them and the poſterior ſurface of the œſophagus. They have no excretory ducts.

GLANDS OF THE ABDOMEN.

1. The *gaſtric glands*, which are muciparous, and ſituated under the external membrane of the ſtomach.

> It ſhould be remembered, that theſe glands only ſecrete the mucus of the ſtomach, and not the gaſtric juice, which is ſeparated by arteries.

2. The *inteſtinal glands*, which are alſo muciparous, and found under the internal membrane of the inteſtines, eſpecially the large.

3. The *meſenteric glands*, ſituated here and there in the cellular membrane of the meſentery. The chyle from the inteſtines paſſes through theſe glands to the thoracic duct.

Meſenteritis, or inflammation of the meſentery, is, in fact, inflammation of theſe glands.

Meſenteric obſtruction ariſes from diſeaſe of theſe glands, and is a frequent cauſe of the *maraſmus* and *atrophia* of children: the chyle being prevented paſſing the glands in ſufficient quantity to form good blood.

4. The *hepatic glands*, alſo called *acini biliosi*, and *penicilli*, which form the ſubſtance of the liver, and ſeparate the bile into ſmall ducts, which at length terminate in the *ductus hepaticus*. See Liver.

Diſeaſes of the glandular part are not yet diſtinguiſhed from the diſeaſed appearances of the cellular connecting ſubſtance, and the other veſſels of the liver.

5. The *cyſtic glands*, which are muciparous, and found under the internal membrane of the gall-bladder, eſpecially about its neck.

6. The *pancreatic glands*, which conſtitute the pancreas: a ſmall duct ariſes from each gland, which unite to form the *ductus pancreaticus*. See Splanchnology.

7. The *epiploic*, or *omental glands*, which are globate, and ſituated in the omentum.

GLANDS OF THE LOINS.

1. The *ſupra-renal glands*, ſituated in the adipoſe membrane, one above each kidney. An excretory duct has never been detected, and their uſe is unknown.

2. The *kidneys*. See Splanchnology.

3. The *lumbar glands*, which are globate, and ſituated about the beginning of the thoracic duct.

4. The *iliac glands*, found about the beginning of the iliac veſſels.

5. The *ſacral*, which are globate glands, and adhere to the os ſacrum.

GLANDS OF THE ORGANS OF GENERATION OF MAN.

1. The *odoriferous glands* of the glans penis, which are ſebaceous, and ſituated around the *corona glandis*.

2. The *mucous glands of the urethra*, ſituated under the internal membrane of the urethra. The mouths of their excretory ducts are called *lacunæ*.

> When theſe glands ſecrete a bland yellow fluid, which they often do from relaxation, it forms a gleet, or *leucorrhœa*; and when an increaſed and morbid ſecretion takes place from venereal virus, it is called *gonorrhœa*.

3. *Cowper's glands*, ſo called from their diſcoverer, are three large muciparous glands, two of which are ſituated before the proſtate gland under the acceleratores urinæ, and the third more forward before the bulb of the urethra.

4. The *proſtate*, a very large, heart-like, firm gland, ſituated between the neck of the urinary bladder and bulbous part of the urethra. It ſecretes a lacteal fluid, which is emitted into the urethra by ten or twelve ducts near the verumontanum, during coition.

> The proſtate gland is very frequently found diſeaſed by abſceſs, ſcrophula, ſcirrhus, calculi, enlargement of its ducts, and a diminution in ſize.

GLANDS OF THE FEMALE ORGANS OF GENERATION.

1. The *odoriferous glands of the labia majora and nymphæ*, which are ſebaceous, and ſituated under the ſkin of thoſe parts.

2. The *odoriferous glands of the clitoris*, which are numerous,

ſituated about the baſis of the clitoris, and are of the ſame nature as the former.

3. The *mucous glands of the urethra,* ſituated under the internal membrane of the female urethra.

4. The *mucous glands of the vagina,* ſituated under the internal membrane of the vagina.

> Theſe glands furniſh the puriform fluid in leucorrhœa and gonorrhœa.

GLANDS OF THE EXTREMITIES.

The *glands in the groin,* or *inguinal glands,* are globate, or lymphatic: they are ſituated in great numbers in the cellular membrane of the inguinal region, and receive the lymphatic veſſels from the glans penis and lower extremities.

> Theſe are the glands which inflame and form bubo in the venereal diſeaſe from abſorption and ſympathy.

The *ſubaxillary glands* are alſo globate, and are ſituated in the cellular membrane of the arm-pit; they are alſo numerous, and receive the lymphatic veſſels from the breaſts and ſuperior extremities.

> The axillary glands ſometimes form bubo from abſorption of venereal and putrid matter.

GLANDS OF THE JOINTS.

The ſmall fat-like maſſes, ſituated within the moveable joints, are erroneouſly called *ſynovial glands*; their ſtructure is not glandular, they are compoſed of adeps and an arrangement of the internal vaſcular membrane of the joint, which gives them a fimbriated appearance. By theſe little maſſes the ſynovia is ſeparated from the blood for the eaſy motion of the joint.

PHYSIOLOGY OF SECRETION.

Secretion is a particular function in an animal body, by which a fluid is ſeparated from the blood, different in its properties from the blood.

The *organs* which ſecrete the various humours are the glands.

The *proximate* or *immediate cauſe* of ſecretion is a ſpecific action of the arteries of the glands; for every ſecretion is formed from the extremities of arteries. The ſecretion of the bile is no exception to this law, for the vena portæ takes upon itſelf the function of an artery; thus the mucous glands ſecrete *mucus*; the ſalival glands, *ſaliva*; the penicilli of the liver, *bile*; the cryptæ of the kidnies, *urine*, &c.

The ſecreted fluids are the proper ſtimuli to the receptacles and ducts, through which the ſecretion is to paſs to its place of deſtination; ſo that the ſecretions move along the excretory ducts by means of the contractility of the coats of the ducts and the aſſiſtance of neighbouring moving powers.

SPLANCHNOLOGY;

OR,

DOCTRINE OF THE VISCERA.

The human body is divided into *head*, *trunk*, and *extremities*.

The HEAD is divided into *face* and *hairy ſcalp*.

The *face* comprehends the *frons*, or forehead; *tempora*, or temples; *naſus*, or noſe; *aures*, or ears; *oculi*, or eyes; *os*, or mouth; *buccæ*, or cheeks; and *mentum*, or chin.

The *hairy ſcalp* is ſubdivided into *vertex*, or crown of the head; *ſinciput*, or fore part; *occiput*, or hinder part; and *latera*, or ſides.

The TRUNK is divided into *neck*, *thorax*, *abdomen*, and *pelvis*.

The *neck* is diſtinguiſhed into an anterior and poſterior part. On the former is an eminence in males formed by the ſcutiform cartilage, called the *pomum Adami*; becauſe the forbidden fruit is ſaid to have ſtuck there; the latter is termed the nape of the neck, or *nucha colli*.

The *thorax* is divided into an anterior and poſterior part, and two ſides.

The anterior part of the thorax is termed the *ſternum*; at its bottom is a hollow, the pit of the ſtomach, or *ſcrobiculus cordis*; and the breaſts are ſituated on each ſide of the ſternum.

The poſterior part of the thorax is termed the *dorſum*, or back; and its ſides, *latera thoracis*.

The abdomen is diſtinguiſhed into REGIONS. The anterior part into three regions:

1. The *epigraſtric*, which lies over the ſtomach, and whoſe ſides are termed the *hypochondriac regions*.

2. The *umbilical*, ſurrounding the navel, and whoſe ſides are called the *flanks*.

3. The *hypogaſtric*, which lies over the urinary bladder, and whoſe ſides are called *groins*.

The *pubes* is the hairy part under the abdomen, between the groins. Under the pubes are the parts of generation—in men, the *ſcrotum* and *penis*; in women, the *labia*, and *rima vulvæ*.

The ſpace between the genitals and anus is called the *perinæum*.

The EXTREMITIES are divided into ſuperior and inferior.

The SUPERIOR EXTREMITY, into *top of the humerus*, *brachium*, *fore-arm*, and *hand*.

The *hand*, into *carpus*, *metacarpus*, and *fingers*.

Fingers, into *pollex*, *index*, *digitus medius*, *digitus annularis*, *digitus auricularis*.

The INFERIOR EXTREMITY is divided into *femur*, or thigh; *crus*, or leg; and *extremity of the foot*.

The *foot*, into *tarſus*, *metatarſus*, and *toes*.

The INTERNAL DIVISION of the body is into three cavities, viz. cavity of the cranium, thorax, and abdomen.

OF THE COMMON INTEGUMENTS.

Theſe are ſo called, becauſe they are the common coverings, as it were, to the body; they conſiſt of the *epidermis*, *rete mucoſum*, *cutis*, and *membrana adipoſa*.

EPIDERMIS.

Epithelium. Cuticula.

The epidermis, ſcarf-ſkin, or cuticle, is a thin, pellucid, inſenſible membrane, covering the whole external ſurface of the body. It is perforated by the hairs, inhaling and exhaling veſſels. Its outer ſurface is dry and horny, and marked with many lines, in which perforations are evident. Its internal ſurface is moiſt and ſhaggy, and connected to the cutis by the *rete mucoſum*, which lies between them; and the veſſels and hairs.

The epidermis not only covers the external ſurface of the body, but alſo many of the internal parts, as the noſe, mouth, anus, vagina, urethra, &c. The thickneſs of the ſcarf-ſkin varies in different parts; it is very delicate over the lips, tongue, glans penis, vagina, and rectum; very thin at the finger-ends, over the face, &c.; and very thick on the ſoles of the feet, and palms of the hand.

The colour of the epidermis is white, which proves that it is a peculiar ſecretion, and not formed by a drying of the rete mucoſum, which, in Ethiopians, is black.

The uſe of this common integument is to cover the very ſenſible cutaneous papillæ.

The epidermis is often ſeen peeling off in ſmall ſcales: this conſtitutes the diſeaſe called *furfura.*

RETE MUCOSUM.

Mucus Malpighianus. Rete Malpighianum. Corpus mucoſum. Corpus reticulare.

A mucous ſubſtance, ſaid to be diſpoſed in a net-like form, between the epidermis and cutis.

The difference of colour in mankind depends on this ſubſtance: in Europeans it is white; in Ethiopians, black, &c.

There is great variety in the thickneſs and tranſparency of the rete mucoſum: in the lips, mouth, over the glans penis, nymphæ, vagina, &c. it is tranſparent and very delicate. It is thickeſt in the ſcrotum.

CUTIS.

Dermis. Cutis vera.

The true ſkin is an elaſtic, ſenſible, extremely porous, and thick membrane, ſituated between the rete mucoſum and adipoſe membrane, covering the whole body.

It is compoſed of a fibrous, vaſcular, and nervous ſtructure. Its external ſurface is covered by the rete mucoſum, and immediately over it is the cuticle: it is here that a vaſt number of *nervous fibrils*, called *papillæ*, are every where projecting from its ſurface to conſtitute the organ of touch: theſe are of various forms, and are moſt exquiſitely ſenſible on the lips, finger-ends, &c. The uſe of the ſkin is to cover the whole body, and afford a ſituation for the organ of touch, exhalation, and inhalation. See Phyſiology of Abſorption.

PHYSIOLOGY OF PERSPIRATION.

Perſpiration is a ſpecies of ſecretion by which the blood is freed of a quantity of aqueous fluid by the exhalent arteries of the ſkin.

It is divided into *inſenſible* and *ſenſible perſpiration:* the former is continually going on, by which means the ſurface of the body is kept ſmooth and moiſt, and may be detected by placing any part of the ſkin near a looking-glaſs, which will become ſoiled The latter, commonly termed *ſweat,* is obſerved occaſionally.

UNGUES.

The nails are horny laminæ, ſituated in the extremities of the fingers and toes.

Use. To defend the nervous papillæ from contuſion.

PILI.

The hairs are thin, elaſtic, dry filaments, growing out from the ſkin.

Colour and situation, various. They are termed *capilli* on the head; *ſupercilia,* or eyebrows, above the eyes; *cilia,* or eyelaſhes, on the margin of the eyelids; *vibriſſæ,* in the noſtrils; *pili auriculares,* in the meatus auditorius; *myſtax,* on the upper lip; *barba,* on the lower jaw, &c. &c.

MEMBRANA CELLULOSA.

Tela celluloſa. Membrana adipoſa. Reticular membrane.

The cellular membrane is compoſed of laminæ and fibrous texture, ſo diſpoſed as to form cells and a web-like ſtructure.

it is found in almoſt every part of the body, connecting them together, and is well exemplified by the butchers blowing up their veal, and by macerating any ſoft part. The cellular membrane is extremely vaſcular, eſpecially that which lies immediately under the ſkin, that about the kidnies, meſentery, &c. and theſe veſſels occaſionally ſeparate oil from the blood into the cellular ſtructure, when it becomes adipoſe membrane. This does not take place generally; hence there is no adeps about the penis, tunica conjunctiva, lungs, &c.

The uſe of the cellular membrane is very conſiderable; it connects parts together; it conſtitutes the bed for the origin of the abſorbents; it allows of friction by its elaſticity, without deforming the part; and it forms the ſubſtance of almoſt all the membranes.

Diseases. The cellular membrane is ſubject to a variety of diſeaſes, ſuch as *anaſarca—ecchymoſis—emphyſema—ſcirrhus*, &c.

OF THE HEAD.

The parts which form the head are divided into external and internal.

The *external parts* are the common integuments, hair, a tendinous expanſion, three pair of muſcles, pericranium, and cranium itſelf.

The *internal parts* are, the dura mater, membrana arachnoidea, pia mater, cerebrum, cerebellum, medulla oblongata, nine pair of nerves, four arteries, and twenty-two venous ſinuſes.

DURA MATER.

Dura meninx.

A ſtrong, thick, fibrous, inſenſible membrane, ſituated immediately under the cranium, to which it adheres very firmly, and covering the external ſurface of the brain.

It is compoſed of two ſtrong membranous layers, or *laminæ.* The external lamina lines the internal ſurface of the cranium, ſupplying the place of perioſteum, for the internal table of the cranium is nouriſhed by its veſſels. The internal lamina is cloſely connected to the external by cellular ſtructure: in many places, however, they are ſeparated ſo as to form a ſpace, or ſinus, in which the blood paſſes as through veins to be returned towards the heart. The internal lamina alſo forms ſeveral proceſſes, the chief of which are the following:

1. The *falx*, or *falciform proceſs*, or *ſeptum cerebri.* This originates, by a very firm attachment, from the middle of the ſphænoid bone and criſta galli, within the cranium, and riſes upwards like a bow, adhering to the external lamina of the dura mater, immediately covering the middle of the frontal bone, the ſagittal ſuture, and occipital bone, until it arrives at the meeting of the internal crucial ſpine of the occipital bone, where it unites to the tentorium In this courſe the falx lies between the hemiſpheres of the brain and its acute edge, being in contact with the *corpus calloſum.* The ſuperior part of the falx contains the longitudinal ſinus.

2. The *tentorium*, or *ſeptum tranſverſum.* This production of the internal lamina of the dura mater ariſes from the clinoid proceſſes of the ſphænoid bone, and paſſes horizontally backwards, attached to the horizontal ramus of the crucial ſpine of the occipital bone. It ſeparates the cerebrum from the cerebellum. In the outer edge of this proceſs paſs the lateral ſinuſes of the dura mater.

3. The *ſeptum cerebelli* is a production paſſing below the tentorium, as if it were a continuation of the falx, and lying between the lobes of the cerebellum. There are ſeveral ſmaller proceſſes which need not be mentioned.

The veins or ſinuſes of the dura mater are—

1. The *longitudinal ſinus.* It commences at the origin of the falx, and paſſes within it, of a triangular form, upwards, and immediately under the ſagittal ſuture of the cranium to the occipital tubercle, where it bifurcates into,

2. The *lateral ſinuſes.* Theſe are continued, one along each tranſverſe or horizontal branch of the crucial ſpine of the os occipitis downwards to the *foramen lacerum in baſi cranii*, where it paſſes out of the cranium, and commences internal jugular vein.

3. The *torcular Herophili.* This is a ſmall vein, or ſinus, in that part of the proceſſes formed by the meeting of the tentorium, falx, and ſeptum cerebelli; it proceeds directly backwards to the bifurcation of the longitudinal ſinus.

Beſides theſe ſinuſes, many other ſmall ones may be noticed.

The *arteries* of the dura mater are beautifully diſpoſed in an arboreſcent form; they are branches of the arteria ſpinoſa, the meningia anterior and poſterior.

Some anatomiſts aſſert it has nerves, whilſt others deny it.

A number of ſmall fatty particles are found near the longitudinal ſinus on the internal ſurface, about the middle, called *Pacchionian glands*, or glands of the dura mater.

The *uſe* of this membrane is to conſtitute the perioſteum of the internal table of the ſkull; to envelope the brain, and form proceſſes which prevent one part from preſſing upon another, and afford a ſituation for the blood to collect and paſs out of the cranium.

DISEASED APPEARANCES.—The diſeaſed appearances of this membrane are, inflammation—adventitious membrane—coagulum between it and the cranium—gangrene—ſpongy tumours—ſcrophulous tumours—oſſification—coagulum, or, as it is improperly called, polypus in the ſinus—obliteration of the ſinus—abſceſſes of the ſinus—the dura mater of a yellow colour.

MEMBRANA ARACHNOIDEA.

Membrana arachnoides. Tunica arachnoides.

A very delicate and tranſparent membrane, ſituated between the dura and pia mater, and ſurrounding the cerebrum, cerebellum, medulla oblongata and ſpinalis. It reſembles a ſpider's web only about the baſis of the cranium, where it is very vaſcular: in other parts it is a diaphanous lamina, ſimilar to the pleura and peritoneum. It not only covers the parts above mentioned, but it enters the cavities of the brain, which it lines, and forms the membrane covering the thalami nervorum opticorum, corpora ſtriata, pedes hippocampi, and fourth ventricle.—The uſe of this membrane is unknown.

Diseased appearances.—The arachnoid membrane of the brain is found adhering to the dura mater—covered with pus—diſtended with coagulable lymph and ſerum—opake and thickened—highly inflamed.

PIA MATER.

Pia meninx.

The pia mater is the third covering of the brain, *cerebellum, medulla oblongata* and *ſpinalis*. It is a highly vaſcular, delicate membrane, embracing thoſe parts cloſely, penetrating between their convolutions, and ſending a vaſt number of veſſels to the cortical ſubſtance of the cerebrum and cerebellum.

The *tomentum cerebri* conſiſts of the fine veſſels that are ſent from this membrane into the brain, which, when pulled out by artificial means, gives the internal ſurface of the pia mater a floccoſe appearance.

Proceſſes are ſent from the pia mater, between the convolutions of the brain. Where one or two convolutions meet, there is a larger ſpace formed, and the pia mater falls, as it were down into theſe ſpaces; and the arachnoid membrane, going directly over theſe excavations, forms a ſpace: theſe are termed the *intergyral* ſpaces of the pia mater.

The veins of the pia mater evacuate their blood into the ſinuſes of the dura mater.

The arachnoid membrane is ſaid, by ſome anatomiſts, to be the external lamina of the pia mater.

The *uſe* of this membrane is to diſtribute the blood to the various parts, by affording a convenient ſituation for the cerebral arteries to ramify on.

Diseased appearances. The diſeaſed appearances of this membrane are inflammation—thickening of the pia mater—pus below it—blood extravaſated into it—turgeſcency of veſſels—abſceſs between it and the brain.

CEREBRUM.

Encephalon. Senſorium commune.

The cerebrum, or brain, is a large viſcus, ſomewhat of an oval figure, ſituated in the cavity of the cranium. That which is called *brain*, in common language, conſiſts of the *cerebrum*, *cerebellum*, and *medulla oblongata*.

The brain is compoſed of three ſubſtances, the medullary, cortical, and black ſubſtance. Some anatomiſts have enumerated a fourth.

1. The *ſubſtantia medullaris*, of a delicate white colour: it compoſes the greater part of the whole brain.

2. The *ſubſtantia corticalis*, called alſo *cineritia*, which encircles the whole brain, and is found in many of the internal parts: the portion which covers the external part is highly vaſcular, receiving the veſſels from the pia mater.

3. The *ſubſtantia nigra* is obſerved by making a tranſverſe ſection through the crura cerebri, in the middle of which it is ſituated.

Upon viewing the ſuperior ſurface of the cerebrum, it exhibits an uniformly convex oval, with a large fiſſure dividing it into two *hemiſpheres*. The under ſurface of the brain is more irregular, and preſents ſix diſtinct *lobes*, which correſpond to the ſix depreſſions, or *foſſæ*, in the baſis of the ſkull; ſo that the two anterior lobes lie on the frontal bone; the two middle, in the depreſſions made by the ſphænoidal bone; and the two poſterior lobes paſs over the cerebellum to occupy the ſuperior occipital depreſſions.

When the pia mater is removed, the brain has ſomewhat the appearance of an irregular convoluted maſs heaped together; the ſpaces between the *gyri*, or *convolutions*, allow the proceſſes of the pia mater to paſs ſome way down, and are termed *intergyral ſpaces* of the brain.

Upon the under ſurface of the brain, between the middle lobes, two proceſſes are ſent downwards and backwards, like legs; theſe are termed the *crura cerebri*; they are ſoon encompaſſed by the crura cerebelli, to form the *pons Varolii*. There are alſo two round white bodies ſeen before theſe, like two peas, called the *corpora candidantia Williſii*.

When the two hemiſpheres of the brain are ſeparated a little from one another, a white ſubſtance preſents itſelf; this is the *commiſſura ſuperior*; it is alſo termed the *corpus calloſum* and *commiſſura magna cerebri*; and the elevated line running along its middle is the *raphe*. The commiſſura ſuperior is covered by a portion of the hemiſpheres of the brain, which laps, as it were, over it on each ſide: theſe portions are termed the *labia cerebri*.

All the parts that have been hitherto enumerated may be ſeen without cutting the cerebrum, except the three ſubſtances of the brain.

When the hemiſpheres of the cerebrum are cut away in a direct line with the ſurface of the commiſſura ſuperior, a large ſurface of the medullary ſubſtance is brought into view; this is the *centrum ovale:* the commiſſura ſuperior cerebri, its raphe, and ſtriæ, and the cortical ſubſtance of the brain, may now be examined minutely.

There are four cavities within the remaining portion of the cerebrum, called ventricles; two of theſe are ſituated laterally, and are called *lateral ventricles:* at their upper part they are ſeparated from each other by a very delicate partition, in which is another *cavity*, but inferiorly they are at a greater diſtance from each other, ſo as to allow of a conſiderable portion of brain, and a cavity, to be ſituated between them; and this cavity is the *third* ventricle.

An inciſion muſt now be made, on either ſide of the raphe of the commiſſura ſuperior cerebri, *into* one of the lateral ventricles, and its upper and outer parietes removed ſo as to completely expoſe the cavity. It is termed lateral from its ſituation: its figure is triangular, having three horns; hence it is alſo called the *tricorn cavity*. The following are to be noticed in each cavity:

1. A very delicate and pellucid membrane ſeparating one cavity from the other, called *ſeptum lucidum*. There is, occaſionally, a ſmall cavity between the laminæ compoſing this ſeptum, called the *fifth ventricle*.

2. A convex brown-coloured body, in the anterior cornu, called *corpus ſtriatum*; it is of a pyriform ſhape, its round end turned towards the face, and its taper end, or *crus*, backwards.

3. A portion of a white convex body, called *thalamus nervi optici*, ſituated behind the former, and ſeparated from it by an

opake line, in which there is ſometimes a blood-veſſel; the line of ſeparation is called *geminum centrum ſemicirculare* and *tænia ſemicircularis*.

4. A very vaſcular ſubſtance lying between theſe parts and the bottom of the ſeptum lucidum, termed *plexus choroides*. This plexus comes into the lateral ventricle at its ſuperior and anterior cornu; and the hole through which it comes is the *foramen Monroianum*.

> Many have denied that this foramen is open when no force has been uſed to ſeparate it. In collections of water in the cavity, it is always open, and very often when there is no water and no force uſed.

The choroid plexus paſſes over the portion of the thalamus of the optic nerve in this ventricle, into the inferior cornu.

5. The *corpus fimbriatum*, a flat tape-like ſubſtance, which goes downwards from the bottom of the ſeptum lucidum into the poſterior and inferior horns of this cavity.

6. The *unguis*, a convex body like the nail of the little finger, ſituated in the poſterior horn of the ventricle, and ariſing from the corpus fimbriatum.

7. The *pes hippocampi*, a long convex ſubſtance occupying the whole of the inferior cornu, and ariſing from the corpus fimbriatum.

8. A triangular ſpace between the unguis and pes hippocampi.

9. A number of columns, more evident in ſome brains than in others, paſſing round the ſuperior and poſterior parietes of the lateral ventricle, called *columna anonyma*.

The lateral ventricles are covered with a fine membrane, formed by a reflection of the pia mater, or tunica arachnoides, which ſecretes a very ſubtile fluid to lubricate the cavities and prevent parts from growing together.

Having demonſtrated the lateral ventricles, the ſituation of the fornix, the third ventricle, and ſome other parts, are next to be ſhewn.

Keeping in view the *commiſſura ſuperior cerebri*, and the proceſs going directly downwards, called the ſeptum lucidum, the fornix will not be difficult to underſtand. It is, in fact, the bottom of the ſeptum lucidum, which ariſes by the inſide of each corpus ſtriatum, and paſſes upwards and backwards, like an ancient arch, and then divides poſteriorly; and all this in leſs than the ſpace of an inch. It ariſes, by two pillars, about a quarter of an inch in length, and the thickneſs of a crow-quill, one from each ſide below the corpus ſtriatum. Theſe two pillars are called the *anterior crura of the fornix:* one lies over the choroid plexus, and forms the ſuperior part of the foramen of Monro. Theſe crura are connected by a medullary ſubſtance, which has no name. Having paſſed over the choroid plexus, the crura unite, and continue united for a very little way; they then ſeparate, and proceed backwards and outwards, by the name of the *poſterior crura of the fornix*, and are ſoon flattened, when they become the *corpora fimbriata*, which paſs round into the poſterior and inferior horns of the lateral ventricles. The ſpace between the poſterior crura of the fornix is triangular, and marked with a number of depreſſed lines, not always conſpicuous; it is termed the *pſalterium*, or *lyra*, from its ſuppoſed reſemblance to David's harp. Theſe circumſtances are ſeen by dividing the two anterior crura of the fornix, and turning it backwards with the ſeptum lucidum and commiſſura ſuperior cerebri. This being done, a ſpace or cavity is perceived between two large rounded bodies; which ſpace is the *third ventricle*. The ſides are formed by the thalami nervorum opticorum: a part of them only was ſeen in the lateral ventricles, but the whole is now brought perfectly into view. There are moſtly one or two elevations on the thalami; one ſometimes in the portion within the lateral ventricles, and one under the corpus fimbriatum; theſe are termed the *colliculi* of the thalami nervorum opticorum. In the third ventricle are to be noticed:

1. The anterior commiſſure, *commiſſura anterior cerebri*. This is a band like a nerve, the thickneſs of a crow-quill, going acroſs the anterior part of the third ventricle, and uniting, as it were, one ſide of the cerebrum to the other: it lies horizontally immediately below the anterior crura of the fornix; and if the brain be carefully diſſected away, by which the ſtriated appearance of the corpus ſtriatum will be expoſed, it can be traced penetrating an inch and a half on each ſide.

2. The third ventricle runs forwards under this commiſſure, becoming ſmaller, until it terminates in a ſlender red ſubſtance, which is ſometimes ſolid and ſometimes hollow; this funnel-ſhaped portion is the *iter ad infundibulum*; it ends in the pituitary gland ſituated in the ſella turcica.

3. The bottom of the third ventricle is formed by a portion of the medullary ſubſtance of the brain going acroſs from one ſide to the other, in the ſame way as the commiſſura ſuperior does; it is therefore termed the *commiſſura inferior cerebri*.

4. There is an elevated line on the ſide of each thalamus nervi optici in the third ventricle, which runs backwards; theſe meet poſteriorly, and have a ſmall, heart-ſhaped, pulpy ſubſtance attached to them, which is the *pineal gland*; and the lines are termed the *peduncles*, or *crura of the pineal gland*. It requires that the plexus of veſſels about this part be carefully diſſected away to ſhew the gland, which will then be ſeen lying over the corpora quadrigemina to be deſcribed. It is the number of veſſels about this gland which gives the lines on the pſalterium which covers the gland.

5. Before the gland, and below its crura, is a nervous band oppoſed to that in the anterior part of the ventricle, and called *commiſſura poſterior*. It cannot be traced penetrating the brain like the anterior.

6. Immediately under this commiſſure is an opening, oppoſed to the iter ad infundibulum; this penetrates through the medulla oblongata, and is termed the *aquæduct* of Sylvius, or *iter à tertio ad quartum ventriculum*.

Behind the poſterior commiſſure are four rounded eminences, called *corpora quadrigemina*; two are ſituated ſuperiorly, and two inferiorly: they were formerly called *nates* and *teſtes*.

The third ventricle is lined by a delicate membrane, a reflection of the pia mater, or *membrana arachnoides*, which ſecretes the ſubtile vapour by which it is lubricated.

> The lateral ventricles of the brain, which are ſeparated from each other by the ſeptum lucidum, it is aſſerted by ſome writers, communicate with one another. The third ventricle having been demonſtrated, and the ſituation of the fornix, this *circuitous* communication may be explained. In the anterior part of the lateral ventricles there is the foramen of Monro, which is ſometimes completely ſhut; and when this is the caſe, there can be no communication whatever between the lateral ventricles: but it is occaſionally open, and then a probe may be paſſed under the anterior crus of the fornix into the third ventricle; and if a probe be paſſed through the foramen of the oppoſite ventricle, the probes will meet in the third ventricle. The communication, therefore, between the lateral ventricles is by the intervention of the third ventricle.

The whole of the cerebrum may now be removed by dividing two proceſſes of the crura cerebri, in the middle of which the ſubſtantia nigra will be ſeen.

A ſection of the pedes hippocampi from near their origin obliquely outwards, exhibits an undulated line, which has the appearance of a ram's horn; this is called *cornu Ammonis*, or *cornu arietis*.

Three pair of nerves only ariſe from the cerebrum:

1. The *olfactory*. Theſe ariſe from the corpora ſtriata, are ſomewhat triangular at their beginning; they proceed forwards under the anterior lobes of the cerebrum, and become flat and pulpy over the æthmoid bone, where they ſend off nerves to the noſe.

2. The *optic nerves*. Theſe originate from the thalami nervorum opticorum, by broad beginnings, which proceed around the ſuperior part of the crura cerebri, to join one another: from this junction two round nerves go off through the optic foramen to the eye.

3. The *motores oculorum*. Theſe ariſe from the crura cerebri, at their lower end, and paſs forwards to penetrate the dura mater juſt above the petrous ridge of the temporal bone.

Diseased appearances of the cerebrum.—Theſe are, a morbid ſoftneſs—a morbid firmneſs—a general change of colour—inflammation—a part of a pulpy conſiſtence—abſceſs—ulceration—a morbid hardneſs of a part—ſcrophulous tumours—extravaſation of blood—veſicles or hydatids—fungus—abſorption of the brain.

In the *lateral ventricles*. Inflammation of the membrane lining them—hydrocephalus internus, or water in theſe ventricles—an alteration of form from veſicles or other bodies protruding.

Corpora ſtriata. Totally deſtroyed by diſeaſe—a number of brown ſpecks in their ſubſtance.

Geminum centrum ſemicirculare. A morbid opacity.

Thalami nervorum opticorum. Thalami united in the third ventricle—a morbid commiſſure between them.

Choroid plexus. Inflammation—turgeſcency of veſſels—

varix—veſicles—hydatids?—ſmall glandiform ſubſtances in the plexus of a ſubcartilaginous conſiſtence—worms.

Septum lucidum. A morbid opacity—water in the cavity between its laminæ.

Third ventricle. Water collected—the ſhape altered by the coaleſcence of the thalami nervorum opticorum.

Pineal gland. Converted into a gritty ſubſtance—converted into an earthy ſubſtance—ſcirrhus—a ſmall yellow body growing to it—a general enlargement.

Plexus of veſſels ſurrounding the pineal gland. Anaſarca—ſurrounded with coagulable lymph—ſurrounded by pus.

CEREBELLUM.

The cerebellum, or little brain, is of a round figure, and ſituated under the tentorium of the dura mater in the inferior occipital depreſſions. It is divided into two lobes by a proceſs of the dura mater, and ſends four proceſſes, or crura, forwards, which, with the crura of the cerebrum, appear to conſtitute the medulla oblongata. The cerebellum is compoſed, like the brain, of a cortical ſubſtance, and a medullary. It is cloſely covered by the pia mater, which ſends proceſſes between its convolutions, that appear more regular than the convolutions of the cerebrum. They firſt divide the external ſurface of the cerebellum into laminæ, and each lamina is again ſubdivided like the leaf of the male fern, ſo that when the cerebellum is cut tranſverſely, this arrangement of the cortical ſubſtance has the appearance of a tree and its branches; and this is termed the *arbor vitæ.*

The two lobes of the cerebellum are ſeparated anteriorly, by a long triangular ſpace, the *fourth ventricle*, which has a communication with the third by means of a long canal, the *iter à tertio ad quartum ventriculum*, in the medulla oblongata.

The fourth ventricle is formed anteriorly by the medulla oblongata, poſteriorly and laterally by the cerebellum: hence it is common to both. In it are to be obſerved—

1. A thin medullary portion connecting the medulla oblongata to the cerebellum, and lying immediately between the crura, ſuperiorly and above the opening of the iter into the fourth ventricle; this is called the *valvula magna cerebri.*

2. A plexus of veſſels, and apparently ſmall glands, called the *plexus of Haller.*

3. A depreſſed line extending down the medulla oblongata in the cavity, which is termed the *calamus ſcriptorius.*

4. Two or three delicate white lines like nerves, which are the origins of one branch of the portio mollis, or auditory nerve.

The *vermiform proceſſes* are ſituated before and behind the crura cerebelli, and are merely a portion of the cerebellum, more protuberant than the reſt, whoſe convolutions are bundled round like a number of ſmall worms.

DISEASED APPEARANCES OF THE CEREBELLUM.—Moſt of the diſeaſed appearances enumerated under the head *cerebrum* have alſo been noticed in the *cerebellum*, viz. inflammation—morbid ſoftneſs—morbid firmneſs—pulpineſs of a part—abſceſs—hardneſs of a part—ſcrophulous tumour—extravaſation of blood—hydatids—and alſo bone in the cerebellum—gangrene.

Fourth ventricle. Water in the ventricle. This is a very rare occurrence; or perhaps the fluid eſcapes before the cavity can be examined—œdema of the membrane lining it.

MEDULLA OBLONGATA.

A white, firm, medullary ſubſtance ſituated beneath the cerebrum, and before the cerebellum, and lying upon the cuneiform proceſs of the occipital bone. It is broad and rounded above, and narrower below, where it is continued into the medulla ſpinalis. From its appearance it favours the idea of its being formed by the crura cerebri in its middle, encompaſſed by the crura cerebelli becoming flattened as they paſs over the former.

If there be any part of the brain in which the fibres, or atoms, all concentrate, it is in the medulla oblongata. Upon its anterior ſurface are to be obſerved—

1. The *pons Varolii,* called alſo *corpus annulare,* which forms the upper and anterior part: it is convex, and covered with many ſtriæ. The baſilary artery runs over it.

2. The *corpora pyramidalia.* Two ſomewhat pyramidal eminences proceeding from the pons Varolii towards the medulla ſpinalis.

3. The *corpora olivaria.* Two more oval eminences, one on each ſide the corpora pyramidalia.

4. A *ſulcus,* between the corpora pyramidalia and olivaria.

Through the middle of the medulla oblongata, juſt before the corpora quadrigemina, the *iter à tertio ad quartum ventriculum* runs.

Three pairs of nerves have been deſcribed as originating from the cerebrum; and ſix more remain to be enumerated, which ariſe from the cerebellum and medulla oblongata.

The *fourth pair,* which are very delicate and long, and are to be ſeen ariſing from the valvula magna cerebri.

The fifth pair, or *trigemini,* are very large, and proceed forwards from the anterior part of the crura cerebelli.

The ſixth pair, or *abducentes,* are leſs than the former, and ariſe from the lower end of the pons Varolii.

The *ſeventh pair* originate about the fourth ventricle.

The eighth, or *par vagum,* proceed from the corpora olivaria by many ſmall branches.

The *ninth pair* ariſe from the ſulcus between the corpora olivaria and pyramidalia.

The *arteries* of the cerebrum, cerebellum, and medulla oblongata, are branches of the carotids and vertebral arteries, which unite in the cranium, and form the *circulus arterioſus Williſii*, the baſilary arterior, the anterior cerebri, and poſterior cerebri.

The *veins* proceed to the ſinuſes of the dura mater.

The brain has no nerves, but ſends off nine pairs.

The uſe of the cerebrum, cerebellum, and medulla oblongata, is to conſtitute the *ſenſorium commune*, the organ of all the ſenſes.

DISEASED APPEARANCES OF THE MEDULLA OBLONGATA. The right inferior eminence of the corpora quadrigemina has been converted into a browniſh pulpy ſubſtance, which diſeaſed appearance extended a little way internally.

MEDULLA SPINALIS.

The ſpinal marrow is a continuation of the medulla oblongata; beginning from the great occipital foramen, and paſſing down the vertebral canal, through the cervical, dorſal, and lumbar vertebræ, where it terminates in a vaſt number of long nerves, which, from their reſemblance to a horſe's tail, are called the *cauda equina*.

It is compoſed, like the brain, cerebellum, and medulla oblongata, of nervous matter, which is diſtinguiſhed into medullary and cortical ſubſtance: the former is external, and the latter internal.

Throughout its whole courſe, the ſpinal marrow is covered by the pia mater, tunica arachnoides, and dura mater; and there is a ligamentous band in the interſtices of the origin of the nerves, from the firſt cervical to the twelfth dorſal vertebra, called the *ligamentum ſerratum*, or *denticulatum*.

Thirty pairs of nerves are given off from the ſpinal marrow in its courſe along the ſpine, which are termed ſpinal nerves.

OF THE ACTION OF THE CEREBRUM, CEREBELLUM, MEDULLA OBLONGATA, AND MEDULLA SPINALIS.

The moſt important functions of an animal body are thoſe of the brain. In order to explain theſe accurately, it is neceſſary to mention a few experiments which have been made upon animals.

Upon dividing, compreſſing, or tying a nerve, the muſcles to which the nerve goes become paralytic. If the nerve thus divided, compreſſed, or tied, had any particular ſenſation, that ſenſation no longer exiſts; but upon untying or removing the compreſſion, its peculiar ſenſe returns.

If the cerebrum, cerebellum, or medulla oblongata, be irritated, dreadful convulſions take place all over the body.

If any part of the brain be compreſſed, that part of the body is deprived of motion which has nerves from the compreſſed part.

From theſe phenomena, it is evident that the cauſe of every ſenſation and motion in an animal body ariſes from the brain and ſpinal marrow, and that from theſe parts it is conveyed to every ſentient part through the medium of the nerves. Hence it follows, that the nerves are the organs by which the various ſenſations are produced. The manner, however, in which the nerves exerciſe ſenſe and motion; how the will is conveyed from the brain to the different parts; and how, from the different parts ſenſations are conveyed to the brain, remains involved in obſcurity; ſeveral hypotheſes have been deduced to explain it, but none appear to be ſatisfactory. See alſo page 157.

OCULUS.

The eye is the organ of viſion, and is ſituated in the orbits on each ſide the noſe.

The parts which form the eye are divided into external and internal.

The external parts are,

1. The *ſupercilia*, or eyebrows: a layer of hair which begins at the root of the noſe, and forms an arch over the eye. Its uſe is to ſhade the eye from too ſtrong a light, and defend it from the ſweat flowing down the forehead: by means of its muſcle it alſo is corrugated, to expreſs certain paſſions of the mind.

2. The *eyelids*, which are two ſemilunar productions; covered internally by the conjunctive membrane and Meibomius's glands, and formed externally by common integuments and a cartilage: they are extremely moveable, eſpecially the upper. The cartilage between the conjunctive membrane and the common integuments of the eyelid is ſemilunar, and termed the *tarſus*. The edges of the eyelids have a number of ſhort hairs ariſing from them and turned outwards, called *cilia*, or eyelaſhes. The uſe of the eyelids is to cover the eyes during ſleep; to defend them from duſt and other ſubſtances, and too ſtrong rays of light; and to lubricate the conjunctiva by frequently moving its ſecretion over the ſurface of the eye.

3. The *puncta lachrymalia*, two ſmall orifices, one of which is ſeen at the end of each eyelid near the noſe. From theſe open-

ings, a canal goes downwards and inwards; and meeting about half an inch from their origin, they form a ſac, called ſaccus lachrymalis, which is continued downwards through the ductus ad naſum into the noſe. The tears are abſorbed by the *puncta lachrymalia*, and conveyed into the noſe through the ſac and canal.

4. The *lachrymal gland*, which is ſituated in the ſuperior part of the orbit in a peculiar depreſſion: it is hard, conglobate, of an oval form, and has a number of excretory ducts which convey the fluid called tears, ſecreted by this gland, on the ſurface of the eye.

5. The *caruncula lachrymalis*, a ſmall red tubercle in the internal canthus of each eye. It has a number of hairs, and ſecretes a ſmegma: it is alſo of uſe to direct the tears into the puncta lachrymalia.

6. The *tunica conjunctiva*, a tranſparent vaſcular membrane, reflected from the edge of one eyelid over the internal part of the eyelid acroſs the bulb, to which it adheres very firmly, and then over the internal part of the other eyelid to its edge. It is more looſely connected with the eyelids than the eye; and where it paſſes the cornea tranſparens, it adheres ſo firmly that it cannot be ſeparated. Its uſe is to lubricate the eye by the moiſture ſecreted from its tranſparent arteries.

The internal parts of the eye are termed the bulb; they conſtitute the eye, properly ſo called, and are—

1. The *ſclerotic membrane*. A very firm, hard, white, horny tunic, into which the muſcles of the eye are inſerted. The anterior part of this coat is glaſſy and tranſparent, and projects ſomewhat; it is called *cornea tranſparens*, to diſtinguiſh it from the other part, which is alſo termed *cornea opaca*. The optic nerve is inſerted into the poſterior part of the ſcle-

rotic

rotic membrane, which appears to be an expanſion of its external tunic, continued from the dura mater.

2. Immediately under the ſclerotic membrane is a very vaſcular, ſoft, and rough membrane, called the *membrana*, or *tunica choroidea*. It adheres to the ſcleroric from the optic nerve all around to the edge of the tranſparent cornea by veſſels; but when it arrives here, inſtead of being continued around the concavity of the cornea tranſparens, it paſſes ſtraight downwards and inwards, forming the coloured part of the eye, which is ſometimes black, blue, &c. This black or blue part is called the *iris*, which poſſeſſes a contractile power, by ſome ſuppoſed to ariſe from muſcular fibres, ſo as to enlarge or contract the opening in its middle, which is the *pupil*. The edge of the choroid membrane that adheres to the ambit of the cornea tranſparens is covered with a white fringe, to which the name of *ciliary circle* is given. Some anatomiſts have ſuppoſed the choroid membrane was formed of two laminæ. The poſterior ſurface of the iris is termed the *uvea*.

The pupil of a fœtus of ſix months is covered by a vaſcular membrane, called *membrana pupillaris*. It is continued acroſs from the ſides of the iris.

3. The poſterior ſurface of the tunica choroides is covered with a black mucus known by the name of the *pigment* of the choroid membrane and uvea.

4. Upon the inſide of the choroid membrane, correſponding to the ciliary circle on the outſide, are a number of *white ſtriæ*, which are called *ciliary proceſſes*.

5. There is a whitiſh, pulpy, vaſcular membrane covering the pigment of the choroides, which is the immediate organ of viſion, and called the *retina*. It paſſes forward from the optic nerve, and terminates in the ciliary proceſſes.

The membranes which have been deſcribed are diſtended with the vitreous humour, cryſtalline lens, and aqueous humour.

1. The *vitreous humour, ſubſtance* or *body*, is a ſoft, round, and very tranſparent ſubſtance, filling the whole hollow ſurface of the retina. It has a cavity in its anterior ſurface, and is ſurrounded with a delicate membrane, called the *hyaloid membrane*, which ſends a number of laminæ, internally forming cells; and theſe cells are diſtended with a tranſparent fluid.

2. The *cryſtalline lens* lies in the depreſſion in the anterior part of the vitreous humour. It is a ſolid, tranſparent, lentiform body, like ice, and is encloſed in a capſule, called the capſule of the cryſtalline lens.

3. The *aqueous humour* is very fluid and tranſparent, and fills the ſpace between the cryſtalline lens and the cornea tranſparens.

The ſpace between the anterior ſurface of the cryſtalline lens and poſterior ſurface of the tranſparent cornea, has the iris hanging like a curtain in its middle, and which divides it into two ſpaces: theſe ſpaces are diſtinguiſhed by the name of *anterior* and *poſterior chambers*.

The *arteries* of the eye are the ophthalmic, central artery of the optic nerve, and the ciliary arteries: theſe convey their ſuperfluous blood into ſmall *veins*, which at length form the ophthalmic vein, a branch of the external jugular.

The *optic nerve* is entirely loſt in the retina. The eye has alſo the ophthalmic nerve of the fifth pair, and another branch of the third pair, which form a *ganglion* that ſupplies the bulb.

The *uſe* of the eye is to receive, refract, and unite the rays of light into a focus, and paint the objects on the *retina*. See Viſion.

Diseased appearances.—*Eyebrows.* Eyebrows wanting, called *madaroſis.*

Eyelaſhes. A double ſet, called *diſtichiaſis.*

Eyelids. A growing together, called *anchyblepharum*—adheſion to the globe of the eye, called *ſymblepharum*—inflammation, or *blepharophthalmia*—*œdema*—*emphyſema*—*atheroma*—*ſarcoma*—ſcirrhus—cancer—*hordeolum,* or ſtye—a pellucid veſicle, or hydatid—warts—a turning outwards of the eyelid, or *ectropium*—a turning inwards, or *entropium*—a thickening of the margin, or *tyloſis.*

Lachrymal paſſages. Obſtruction of the ducts—dropſy of the ſaccus lachrymalis—fiſtula lachrymalis—tumour on the outſide of the ſac, or *anchylops.*

Caruncula lachrymalis. An enlargement, or excreſcence, called *encanthus*—wanting, or *rhyas.*

Conjunctive membrane. Inflammation, or *ophthalmia*—veſicles, or *phlyctenæ*—a hard tubercle adhering to it, or *papula.*

Cornea tranſparens. A morbid thickneſs and opacity, or *ſtaphyloma*—abſceſs, or *onyx*—too great a convexity, cauſing ſhortneſs of ſight, or *myops*—too flat, cauſing *preſbyops,* or long ſight.

Bulb of the eye. Cancer—a protruſion, or *ophthalmoptoſis.*

Iris. No pupil, or *ſynezeſis.*

Aqueous humour. Pus inſtead of water, or *hypopium*—a white humour, or *hypogala.*

Cryſtalline lens. Cataract, ſeveral ſpecies.

Vitreous humour. A turbidneſs, or *glaucoma.*

Retina. Inflammation.

Operations performed on the eye. Removal of excreſcences—operation for fiſtula lachrymalis—ſyringing the lachrymal paſſages—operation for cataract—extraction and couching—removal of a cancerous eye.

AURIS.

AURIS.

The ear is the organ of hearing. It is diſtinguiſhed into the external and interal ear.

The *external ear* is formed of an oval cartilage, concave before, having ſeveral eminences and depreſſions; and convex behind, covered with common integuments.

1. The external ridge is called the *helix*; it curls inwards. 2. The *antihelix*, a ridge ſituated more internally than the helix. 3. The *concha*, or cavity, bounded by the antihelix and tragus. 4. The *tragus*, a cartilaginous eminence covered with long hairs. 5. The antitragus, a ſmall depreſſion oppoſite to the tragus, at the bottom of the antihelix. 6. The *lobule* of the ear, which hangs downwards, and is bored for rings.

The bony meatus auditorius of the ear is lined by a cartilage and common integuments, between which are the glands that ſecrete the wax. This canal, the *meatus auditorius externus*, is terminated by a membrane of the tympanum.

The external ear has ſeveral muſcles and ligaments, which have been deſcribed.

The *internal ear* lies concealed within the petrous portion of the temporal bone; it is divided into the tympanum, maſtoid cells, and labyrinth.

The *tympanum* is an irregularly round cavity covered by a muſcle, called the membrana tympani, like a drum by its parchment. It contains four delicate bones, the *malleus*, *incus*, *ſtapes*, and *os orbiculare*, and ſome muſcles belonging to them, and the membrana tympani. It is every where, even the bones, covered with a very vaſcular membrane, and has ſeveral openings, which, with the maſtoid cells, are deſcribed in the Oſteology.

The *labyrinth* is compoſed of the cochlea and ſemicircular canals; theſe have alſo been deſcribed in the Oſteology. There remain, however, to be deſcribed the ſoft parts which are found within them, and which are the immediate organ of hearing: theſe are—

1. The *membranous ſemicircular canals*, which are ſituated within the bony ſemicircular canals, and looſely connected to their perioſteum by a fine cellular membrane, a quantity of fluid being interpoſed, which circulates through the labyrinth. Each of theſe membranaceous ſemicircular canals proceeds from the veſtibule, and at its commencement ſwells into an oval *ampulla*; and theſe oval ampullæ originate from a membranaceous ſacculus within the veſtibulum, which is termed the *alveus communis*. This ſacculus, the ampullæ, and membranaceous canals, therefore, occupy the veſtibulum and oſſeous ſemicircular canals; and it is by means of the alveus communis that the membranous canals all communicate with one another, they being, as it were, tubes going from the ſacculus. They are diſtended by a very limpid fluid.

2. The auditory nerve is expanded upon the ſides of the alveus communis and ampullæ, in a beautiful manner, like a fan or beard, reſembling very much the mucous expanſion of the optic nerve in the form of the retina. There is one more evident expanſion of the nerve adhering to the ſpinous proceſs of the veſtibule, which is termed the *barbula*.

3. The *zona mollis* of the cochlea; which is compoſed of two ſubſtances: the one is of a conſiſtence between cartilage and membrane, ſomewhat of a coriacious texture; the other is perfectly membranous, and almoſt of a mucous conſiſtence. The former adheres very firmly to the ſpiral lamina of the cochlea, which it accompanies throughout; and the latter, which appears to be formed of a duplicature of the perioſteum, is continued from the coriacious part to the ſide of the cochlea,

ſo that it completes the ſeptum, dividing the cochlea into two ſcalæ.

4. The auditory nerve, having ſupplied the veſtibule, proceeds to the cochlea, and terminates by a vaſt number of fibres, which proceed through bony canaliculi of the modiolus, and come out on the zona mollis, forming a beautiful *nervous pulp*.

PHYSIOLOGY OF HEARING.

The phyſiology of hearing has been already conſidered at page 158, which the reader may conſult, and then return to following more minute explanation.

The baſis of the ſtapes jets within the veſtibulum, in that part where, as in a centre, it looks towards the common channel of the membranous ſemicircular canals, and the orifice of the ſcala veſtibuli; therefore the ſonorous vibrations of the ſtapes are communicated to the water of the labyrinth, and the undulations ſent out from this part as from a centre to a circumference, and ſtrike firſt the alveus communis, and are then propagated throughout the liquor of the labyrinth which ſurrounds the membranous ſemicircular canals. Theſe undulations ſtrike the membranous ſemicircular canals on their whole ſurface, and the canals agitate the fluid they contain as well as that in the alveus communis; and theſe agitations now affect the nervous expanſions in the alveus communis and membranous ſemicircular canals. One ſcala of the cochlea opens into the veſtibulum, whilſt the other begins from the feneſtra ovalis; both ſcalæ are filled with the water of the labyrinth, and communicate with each other at the apex of the cochlea; ſo that the ſonorous vibrations are communicated alſo to the ſcalæ of the cochlea. In the middle between the ſcalæ of the cochlea, is the zona mollis, on which the nerve is alſo ſpread; hence the undulations are communicated to the nerves of the cochlea. In all theſe affections of the auditory nerve, namely, in that of the ampullæ of the ſemicircular canals, the alveus communis, and the ſpiral zone of the cochlea, hearing conſiſts. The auditory nerve conveys theſe vibrations to the ſenſorium, where the mind is informed of the preſence of ſound, and judges of its difference. Gravity and acuteneſs of ſound depend upon the number of vibrations given at the ſame time.

NOSE.

The noſe is a prominence of the face, between the eyes and mouth.

It is divided into the external noſe, properly ſo called, and an internal one. The former is diſtinguiſhed into root, back, apex, and alæ: the latter into two noſtrils, five cartilages, the frontal, æthmoidal, and maxillary ſinuſes.

1. The *root* is the ſuperior part, contiguous to the forehead.

2. The *back*, or *bridge*, is the middle prominence, which goes downwards.

3. The *alæ*, or *pinnæ*, are the lateral and moveable parts.

4. The *apex*, or tip, is the inferior round part.

5. The cartilages of the noſe are, one in the middle, which, with the vomer, completes the *ſeptum narium*, and two on each ſide of the ſeptum, which form the round tip, and opening into the noſtrils.

6. The *frontal ſinuſes*: theſe communicate with the ſuperior part of the noſtrils.

7. The *ſphænoidal* ſinus, which opens into the poſterior noſtrils.

8. The *maxillary* ſinuſes, which open into the anterior noſtrils at their ſides.

9. Beſides theſe parts, the noſtrils have the *turbinated por-*

tion of the ethmoid bone, and the inferior ſpongy bones hanging within them.

10. The *opening* of the ductus ad naſum.

All theſe parts are covered with a very vaſcular pituitary membrane, called the *Schneiderian*, from its diſcoverer, upon which the excretory ducts of the mucous glands open, and the olfactory nerves are beautifully diſtributed: ſo that the pituitary membrane not only covers the noſtrils, but the ſinuſes communicating with them.

The *arteries* of the internal ſoft parts are branches of the internal maxillary and internal carotids.

The *veins* terminate in the orbital, temporal veins, which convey their blood to the internal jugular.

Beſides the olfactory *nerves*, the noſe is ſupplied by the ophthalmic nerve and ſuperior maxillary.

The *noſe* is the organ of ſmelling; and it aſſiſts in reſpiration and ſpeech.

DISEASED APPEARANCES. Inflammation of the mucous membrane, called *catarrhus*—ulceration, called *ozæna*—morbid thickening—polypus—obſtruction in the ductus ad naſum—an adventitious opening through the lachrymal bone—abſceſs of the antrum.

OPERATIONS PERFORMED ON THE NOSE. Syringing the ductus ad naſum — removing polypi—paſſing a hollow tube through the noſtril into the œſophagus—perforating the antrum of Highmore—plugging up the noſtrils in caſes of hæmorrhage.

MOUTH.

The cavity of the mouth is covered by the cheeks and lips.

The *cheeks* are compoſed of common integuments and various muſcles going downwards from under the eye, over the ſuperior maxillary, to the inferior maxillary bone.

The *lips* are compoſed of common integuments and muſcles, and are highly vaſcular, which gives them that beautiful redneſs in health. Where the lips meet together, it is called the *angles* or *commiſſure* of the lips.

The *arteries* of the lips are the coronary and angular arteries. Thoſe of the cheeks are branches of the inferior orbital, alveolar, and facial arteries.

The *veins* empty themſelves into the external jugular.

The *nerves* are, the *infra-orbital*, the *labial* nerve, a branch of the inferior maxillary, and the *facial*.

Theſe nerves are ſometimes the ſeat of the *tic douloureux*.

The cavity of the mouth is bounded ſuperiorly by the hard and ſoft palate, inferiorly by the tongue, anteriorly and laterally by the teeth, and poſteriorly it is open, communicating with the fauces; hence the gums, the palate, the velum pendulum palati, and the membrane covering theſe, are to be conſidered here.

1. The *gums*, a red, vaſcular, ſpongy ſubſtance of a peculiar nature, encompaſſing the necks of the teeth, and lying on each ſide the alveolar proceſſes.

The edges of the gums have the power of ſecreting the tartar ſometimes found upon the teeth.

When the gums bleed, are more ſpongy than ordinary, and ulcerate along their margin; they cauſe a fœtor of the breath, and the diſeaſe is called *ſtomacace*.

The gums are often the ſeat of abſceſs, called *epulis*, or gum-boil.

They occaſionally ſhoot out a very vaſcular production, or *fungus*, difficult to cure.

2. The *palate*. The roof of the mouth is called the palate; the anterior portion is much harder than the poſterior, being

partly formed of bone, and hence diſtinguiſhed into hard and ſoft palate. The hard palate is that portion of the roof which is formed by the palate bones and palatine portions of the ſuperior maxillary bones; it is covered with perioſteum and the common membrane of the mouth, which is formed into *rugæ*. The ſoft palate, or *velum pendulum palati*, extends backwards from the hard palate, forming two arches: it is compoſed of the internal membrane of the mouth, a number of glands and muſcles. From the middle of the velum pendulum palatinum there hangs down over the tongue a conical body like a nipple, ſeen when the mouth is opened, which is the *uvula*. From the ſides of the uvula, towards the ſides of the tongue, the ſoft palate forms two arches: the anterior of theſe is fixed to the ſides of the tongue, but the poſterior extends backwards to be inſerted into the pharynx. Between theſe two arches, on each ſide, at their bottom, is an oblong gland, called the tonſil; it has ſeveral excretory ducts opening upon its ſurface.

> The hard palate is ſeldom found diſeaſed; but the ſoft palate, uvula, and tonſils are quite the reverſe. Inflammation—ulceration—relaxation—enlarged tonſils—tonſils filled with a ſebaceous ſubſtance—tonſils perforated—complete loſs of the ſoft palate, are amongſt the moſt frequent diſeaſed appearances.

3. The *membrane* covering the mouth is a reflection of the ſkin and epidermis: it is very ſpongy and cellular, having a number of ſmall glands under it, and their excretory ducts opening upon its ſurface.

> It is ſubject to inflammation, which, about the tonſils and ſoft palate, is called *cynanche tonſillaris*, and gangrene in thoſe parts called *cynanche maligna*.

The ſalivary glands, whoſe excretory ducts pour the ſaliva into this cavity, are conſidered in Adenology.

The mouth is the organ of maſtication and deglutition. It alſo affords a paſſage to the air in breathing, and aſſiſts in forming the ſounds for ſpeaking.

PHYSIOLOGY OF MASTICATION.

Maſtication is the comminution of the food between the teeth, effected by the jaws, the tongue, cheeks, and lips. The powers which move theſe parts are their various muſcles, by which the lower jaw is pulled from the upper, and again brought to it, whilſt the tongue perpetually puts the food between the teeth, and the cheeks and lips impede it, when maſticated, from falling out of the mouth. By this proceſs, the food is divided, lacerated, and, as it were, ground, and mixed with the ſaliva, mucus of the mouth, and the atmoſpherical air, and thus rendered fit to be ſwallowed and digeſted; ſo that maſtication is, in fact, an incipient digeſtion.

TONGUE.

A muſcular body, moveable in every direction, and ſituated in the inferior part of the mouth.

It is divided into a baſe, body, back, an inferior ſurface, and two ſides.

The *baſe* is that part which lies on the os hyoides.

The *body* is the middle and larger part, which ends in the more moveable part.

The ſuperior ſurface is called the *back*: on it are to be noticed the opening of ſeveral glands.

The *inferior ſurface* is connected to the parts below by the membrane of the mouth, which forms a bridle, or *frenulum*, behind the middle inciſores.

The tongue is formed of a number of muſcular fibres, which are conſidered in Myology, covered by the common integuments.

The external ſurface is every where covered with nervous papillæ, ſome of which are pyramidal, others conoid, and ſome fungiform: they are moſt numerous on the ſides and apex, and upon the middle of the back.

This organ is plentifully ſupplied with *arteries*, which come off from the carotid, and are termed *raninæ*, or *lingual*.

The ſmaller *veins* empty themſelves into the great lingual vein, which proceeds to the external jugular.

The *nerves* of the tongue are alſo numerous, ariſing from the fifth, eighth, and ninth pairs.

The *uſe* of this viſcus is to conſtitute the organ of taſte, and aſſiſt in chewing, ſwallowing, ſucking, and taſting.

DISEASES OF THE TONGUE. Inflammation, called *gloſſitis* —abſceſs; where it appears under the tongue it is called *ranula*—gangrene—ulceration; ſmall white ulcers are called *aphthæ*; beſides common ulcers, there is a ſpecies of ulceration along the ſides, of a chronic nature—cancer—frœnum too ſhort; when the perſon is ſaid to be tongue-tied—ſmall veſicles on the ſides of the tongue, or hydatids.

OPERATION. The clipping the frœnum when too ſhort.

OF THE NECK.

The parts which form the neck are divided into external and internal.

The *external parts* are the common integuments, the muſcles of the neck, eight pair of cervical nerves, two carotid arteries, two vertebral arteries, two external jugular veins, two internal jugular veins, the jugular glands, the thyroid gland, the eighth pair of nerves of the cerebrum, and the great intercoſtal.

The *internal parts* are the fauces, pharynx, œſophagus, larynx, and the trachea.

FAUCES.

The cavity behind the ſoft palate and tongue, which ends in the pharynx.

It is bounded poſteriorly by the bodies of all the cervical vertebræ, ſuperiorly by the cuneiform proceſs of the os occipitis and middle of the ſphænoid bone, inferiorly by the pharynx, and is ſurrounded by muſcles.

The poſterior noſtrils open into the fauces behind the velum pendulum palati.

There are alſo, at the ſides of the fauces, the openings of the Euſtachian tubes.

The whole of this cavity is lined with a very vaſcular and mucous membrane continued from the mouth and noſtrils, on which are the opening of many mucous glands.

The *arteries* of this cavity come from the internal maxillary, and neighbouring branches.

The veins evacuate their blood into the external jugular.

The nerves are branches of the fifth and eighth pairs.

The uſe of the fauces is for deglutition, reſpiration, ſpeech, and hearing.

DISEASES OF THE FAUCES. Inflammation, or *cynanche tonſillaris* — ulceration; which may be either venereal, or have hardened edges, like a ſyphilitic ſore, but be merely a chronic ulceration, or aphthæ — polypus hanging from the noſtrils — obſtruction of the Euſtachian tubes — anaſarca, or *angina ædematoſa*.

Operations. Removal of the naſal polypus when in the fauces—ſyringing the Euſtachian tubes.

PHARYNX.

The pharynx is a muſcular ſac, like a funnel, ſituated behind the larynx, adhering to the fauces, and terminating in the œſophagus.

It is **connected**, by means of muſcles, with the cranium, vertebræ, and os hyoides.

Its **use**, to receive the maſticated food, and convey it into the œſophagus.

ŒSOPHAGUS.

The œſophagus, or gullet, is a membranous and muſcular tube, ſituated between the pharynx and ſtomach, and deſcending behind the trachea down the neck, and along the poſterior ſpace of the mediaſtinum into the abdomen.

It is compoſed of three tunics, or coats—

1. A *common tunic*, which is a condenſed cellular membrane.

2. A *muſcular one*, which conſiſts of very dilatable muſcular rings.

3. A *villous coat*, ſituated on the inſide; between this and the former tunic are a number of muciparous glands which ſecrete the mucus of the œſophagus.

The œſophagus conveys the food into the ſtomach.

Diseases. Inflammation, or *œſophagitis*—coagulated lymph thrown out on the internal ſurface—ulceration—contraction—ſcirrhus—cancer—converted into cartilage—fungus—pouched.

Operations. Œſophagotomy, or cutting into the œſophagus—introduction of the probang—the introduction of a flexible hollow tube, to convey any ſtimulating ſubſtance into the ſtomach to recover drowned perſons—cauſtic bougies, to remedy ſtricture.

Arteries. Branches of the aorta.

Veins, empty themſelves into the vena azygos.

Nerves, from the eighth pair and great intercoſtal.

Use, for deglutition.

PHYSIOLOGY OF DEGLUTITION.

Deglutition is the conveying of the maſticated food from the cavity of the mouth into the fauces, and from the fauces through the œſophagus into the ſtomach. This is performed by the jaws ſhutting, ſo as to prevent the food from falling out of the mouth; the tongue is then applied to the palate, by which the food lying upon the back of the tongue is preſſed into the cavity of the fauces, where it is received by the dilated pharynx. The pharynx then is irritated to contract, by which the food is expelled into the œſophagus, by the contraction of whoſe muſcular fibres it is conveyed through the cardia into the ſtomach.

The pharynx is dilated by its dilatatory muſcles, and by the root of the tongue, os hyoides, and larynx being drawn forwards and backwards by their proper muſcles.

The food is prevented, during the act of ſwallowing, from paſſing into the poſterior opening of the noſtrils, the Euſtachian tube, and larynx, by the velum pendulum palati and uvula being preſſed againſt the former, and the epiglottis being bent backwards over the glottis.

When a fluid is to be drank, the head inclines backwards, the ſame actions take place, and the fluid paſſes on each ſide of the epiglottis.

During deglutition, the food is covered with the mucus of the fauces and œſophagus.

LARYNX.

A hollow body, compoſed of cartilages, muſcles, and ligaments, ſituated at the root of the tongue, in the fore part of the neck.

It is attached above to the os hyoides by muſcles and ligaments, and poſteriorly to the baſis of the tongue by membranes, and to the pharynx by various muſcles.

The cartilages which form the larynx are the following:

1. The *thyroid*, or *ſcutiform*, which forms the anterior and ſuperior part, and by far the greater part of the larynx. It appears to conſiſt of two cartilages, joined together anteriorly, and forming a projection in the male neck, called the *pomum Adami*, but receding from each other in the poſterior part. At the upper end of each poſteriorly is a little projection; theſe are termed the *cornua* of the thyroid cartilage; they are joined to the cornua of the os hyoides by ligament.

2. Two *arytænoid cartilages*, which are found behind the former, placed perpendicularly upon the cricoid, and forming a ſpace between them, the opening into the larynx, called *glottis*, or *rima glottidis*.

3. The *cricoid cartilage*, which is the baſis of the others: it is narrow before, and broad behind; and is immediately above the larynx.

4. The *epiglottis*, an oval cartilage, at the root of the tongue, which covers the glottis when the food paſſes into the pharynx.

The larynx is every where covered with a very ſenſible, vaſcular, and mucous *membrane*, a continuation of the membrane of the mouth.

The larynx is variouſly contracted and dilated by *muſcles*, which are conſidered in Myology.

The *arteries* of the larynx are given off from the external carotid and ſubclavian. The *veins* evacuate their blood into the external jugulars.

It has *nerves* from the eighth pair, or *par vagum.*

The thyroid gland covers the thyroid cartilage, and is conſidered in the Adenology.

The *uſe* of the larynx is to form the voice and its various modifications, and to afford a paſſage to the air into, and out of, the lungs.

Diseases. Inflammation of the pituitary membrane, or *laryngitis*—ulceration—enlargement of the epiglottis—oſſification of the thyroid and cricoid cartilages.

Operation. The Introduction of a flexible hollow tube to throw air into the lungs for the recovery of drowned perſons.

PHYSIOLOGY OF THE VOICE.

The voice is cauſed by the ſound of the air propelled through the glottis; ſo that the organ of the voice is the larynx and its muſcles.

The ſhrillneſs and roughneſs of the voice depends on the diameter of the glottis, its elaſticity, mobility, and lubricity, and the force with which the air is expelled; thus when the diameter is increaſed, the voice is more baſs, and *vice verſa.*

SPEECH

Is the modification of the voice in the cavity of the mouth and noſtrils.

VENTRILOQUISM

Conſiſts in the motion of the uvula, epiglottis, and fauces, by which the ſounds are modulated without the lips, teeth, or palate. The mouth being nearly ſhut, and the voice reſounding between the larynx and cavity of the noſe, the ſound is returned as if emitted by ſome one at a diſtance.

TRACHEA.

A tube which deſcends from the larynx in the anterior part of the neck, before the œſophagus, into the thorax, where it divides into two branches, called bronchia.

It is compoſed of cartilages, muſcles, and membranes:

1. The *cartilages* are round, but not complete rings, for they are fleſhy poſteriorly, where they lie over the œſophagus.

2. The muſcles of the trachea paſs between theſe rings, and are called *meſochondriac.* They are of two kinds:

α. *Muſculi meſochondriaci longitudinales.* Theſe are compoſed of muſcular fibres, which go directly downwards from one cartilage to the next throughout the minuteſt ramifications of the bronchia.

β. *Muſculi meſochondriaci tranſverſales.* A number of muſcular fibres, which go acroſs from one end of the cartilage to the oppoſite.

3. The internal ſurface of this tube is lined with an exquiſitely ſenſible and vaſcular mucous *membrane* continued from the larynx.

The BRONCHIA, entering the ſubſtance of the lungs, divide into innumerable little branches, which terminate in the *veſiculæ pulmonales*, or air-cells.

The *veſſels* of the trachea are common with the larynx.

It has nerves from the recurrent branch of the eighth pair.

The *uſe* of the trachea is to admit the ingreſs and egreſs of the air into the lungs.

DISEASES. Inflammation of the mucous membrane, or *cynanche trachealis*, which is of two kinds:

1. A high ſtate of inflammation, known by ſeeing an immenſe number of red veſſels, which are not found in a healthy ſtate.

2. A ſpecific inflammation, known by the formation of an adventitious membrane formed of coagulated lymph, and ſometimes without any apparent increaſe of red veſſels.

Ulceration—diſeaſed ſtate of the ſofter parts, from ſcirrhus and cancer of the œſophagus—polypus—ſcirrhus—oſſification.

Operation, Tracheotomy, to admit of reſpiration.

OF THE THORAX.

The thorax, or cheſt, is that part of the body which is ſituated between the neck and belly, and to whoſe ſides the upper extremity is attached.

The thorax is in figure pyramidal; broad and convex below, where it is ſeparated by the diaphragm from the abdomen; and obtuſe above, where it is terminated by the pleura, cellular ſtructure, muſcles, and veſſels; hollow behind, owing to the convexity of the ribs as they approach the ſpine; convex laterally; ſomewhat flattened in front.

The cavity of the thorax is divided internally into five cavities:

1. Into a right and left cavity of the thorax.
2. Into the cavity of the pericardium.
3. Into the anterior ſpace of the mediaſtinum.
4. Into the poſterior ſpace of the mediaſtinum.

The parts which conſtitute the cheſt are divided into external and internal—

The external parts are the common integuments, the breaſts, various muſcles, and bones.

The internal parts, or *viſcera*, of the thorax are, the pleura, the lungs, the thymus gland, the œſophagus, ductus thoracicus, arch of the aorta, branches of the venæ cavæ, the vena azygos, par vagum, and great intercoſtal nerves.

DISEASES. Beſides the affections of the thoracic viſcera, this part is ſubject to *empyema*, or a collection of pus in the lateral cavity—*hydrothorax*, or water in the cheſt—a collection of pus in the anterior ſpace of the mediaſtinum.

OPERATIONS. *Paracenteſis thoracis*, for empyema and hydrothorax—trepanning the ſternum, to give an exit to the pus collected in the anterior ſpace of the mediaſtinum—taking up the intercoſtal artery.

MAMMÆ.

The breaſts are two ſoft hemiſpheres, adhering to the anterior and lateral parts of the cheſt, over the pectoral muſcle. In the male, the breaſts are termed *mamillæ*; in women, *mammæ*; and in brutes, *ubera*.

The human breaſt is compoſed of much ſoft fat, which gives it the rotundity, and is of a glandular fabric, plentifully ſupplied with blood-veſſels, nerves, &c. which ſecrete the milk, and convey it by its excretory ducts to

The *papilla*, or nipple, a very irritable prominent body, in the centre of each breaſt, in which the excretory ducts of the glands of the breaſt, called *galactopherous* and *lactiferous ducts*, open.

The nipple is ſurrounded by a brown circle, called the *areola*, or *halo*.

The *arteries* of the breaſts are branches of the internal and external mammaries, many of which anaſtomoſe with the epigaſtric artery. The veins bear the ſame name, and accompany the arteries, emptying their blood into the ſubclavian and axillary vein.

The *nerves* are very numerous, and ariſe from the ſuperior intercoſtals, which are given off from the dorſal nerves.

The breaſts are plentifully ſupplied with lymphatics, which proceed to the ſubaxillary glands.

The uſe of theſe organs is to ſecrete and contain the milk for new-born infants.

DISEASES. Inflammation, or *maſtitis*, or *maſtodynia*—ſcirrhus—cancer—induration of the glandular fabric.

OPERATIONS. Opening of mammary abſceſs—removal of cancerous breaſt.

PLEURA.

A tranſparent ſmooth membrane, which lines the internal ſurface of each lateral cavity of the thorax, and covers its viſcera. Its external ſurface is attached by veſſels and cellular membrane to the ribs, intercoſtal muſcles, ſternum, bodies of the dorſal vertebræ and diaphragm; ſo that it may be compared to two bags; the right lies cloſe to the internal ſurface of the ribs, down to the diaphragm, paſſes over it, giving it a tunic; and having reached the heart-bag, near the middle of the inferior part of the cheſt, it adheres to it, and goes up to the ſternum, to the very top of the cheſt, where the bronchia enter, and the lungs begin; and in this part the pleura is reflected over them:—the left bag lines the left cavity in the ſame way. The pleuræ of both cavities at the ſides of the bodies of the vertebræ go directly forwards to the ſternum, without coming into contact with one another, a vaſt quantity of cellular ſtructure being interpoſed, and thus divide the thorax into a right and left cavity. This partition of the cheſt is termed *mediaſtinum*, in which are two ſpaces: the anterior ſpace is directly behind the ſternum; the poſterior, immediately before the bodies of the dorſal vertebræ.

The pleura has *arteries* from the intercoſtals and internal mammaries, which, in a healthy ſtate, are not viſible; they return their blood by the intercoſtal and internal mammary veins.

The *nerves* of this membrane are few, and ariſe from the ſuperficial branches of the cardiac plexus.

The *uſe* of the pleura is to form the mediaſtinum, to divide the thorax into two cavities, to render the ſurface moiſt by the vapour it exhales, and to give a membrane to the lungs and pericardium.

Diseases. Inflammation, called *pleuritis*—adheſion to the lungs—converted into cartilage—oſſified—ſmall white bodies in the pleura, like ſcrophulous glands.

Operations. Perforating the pleura for empyema and hydrothorax.

MEDIASTINUM,

The membranous partition formed of a duplicature of the pleura, which divides the cheſt into two cavities.

In the mediaſtinum, that is, between the two pleuræ of which it is formed, are—in the anterior part, the pericardium, the thymus gland in children—in the poſterior part, the œſophagus, large veſſels of the heart, the par vagum, great intercoſtals, and thoracic duct.

LUNGS.

Two viſcera, ſituated in the cavities of the thorax, by which we breathe.

Diviſion. Into right and left lung: the right has three *lobes*, the left only two.

The ſubſtance of the lungs is bronchial, veſicular, vaſcular, nervous, glandular, and parenchymatous.

1. The bronchia are continuations of the trachea, and are formed exactly of the ſame materials, viz. cartilage, and intercartilaginous muſcles.

2. The veſicles of the lungs are called the *pulmonary* or *air veſicles*; they form by far the greater bulk of the lungs, and are placed at the very extremities of the ramifications of the bronchia; being apparently formed of the internal membrane lining the bronchia. It is on the internal ſurface of theſe veſicles that the pulmonary artery forms a beautiful plexus of delicate veſſels.

3. The *veſſels* of the lungs are—the pulmonary artery, whoſe ramifications are very numerous, forming a net of veſſels on the internal ſurface of the air veſicles—the pulmonary veins, which return the blood from the pulmonary arteries—the bronchial artery, which nouriſhes the lungs, and returns its blood through correſponding veins into the vena azygos—the abſorbents of the lungs, which are deep-ſeated and ſuperficial.

4. The *nerves* of the lungs are derived from the par vagum and great intercoſtal, and form an anterior and poſterior pulmonic plexus.

5. The *glands* about the bronchia are very numerous, and termed bronchial. Lymphatic glands are alſo found more internally.

6. The *parenchyma* of the lungs, or cellular membrane, connects the veſſels, bronchia, and veſicles, and is very elaſtic.

The lungs are connected with the heart by means of the pulmonary artery and veins, and with the trachea by means of the bronchia; the other part is looſe in the cavity of the cheſt, having a coat from the pleura, called *pleura pulmonalis*.

The *uſe* of the lungs is for reſpiration and ſanguification.

Diseases. Inflammation, called *pulmonitis*—abſceſs, called *vomica*—tuberculated—ſcirrhus—air-cells enlarged—converted into a ſubſtance like liver—earthy matter in the lungs—oſſification—hydatids—pleura pulmonalis inflamed; covered with a coat of coagulated lymph—thickened—cartilaginous—oſſified—adhering to the pleura coſtalis.

PHYSIOLOGY OF RESPIRATION.

Reſpiration conſiſts of *inſpiration*, or the ingreſs of the air into the lungs, and *expiration*, or the egreſs of the air from the lungs.

During ſleep, reſpiration is performed without our knowledge, and therefore termed *ſpontaneous*; but when it can be augmented or diminiſhed according to our will, it is termed *voluntary*.

The *exciting cauſe* of inſpiration is the air ruſhing into the lungs, and irritating its nerves, which irritation is, by conſent of parts, communicated to the diaphragm and intercoſtal muſcles, and compels them to contract. The contraction of the intercoſtal muſcles and diaphragm, and the preſſure of the elaſtic air, therefore dilate the cheſt. The air being deprived of its ſtimulus, the intercoſtal muſcles and diaphragm become relaxed, the cartilages of the ribs and abdominal muſcles, before expanded, return to their former ſtate, and thus the air is expelled from the lungs. The ſmall branches of the pulmonary artery form a beautiful *net-work of veſſels* on the internal membrane of the air veſicles. During expiration, the air-veſſels are collapſed; conſequently the blood-veſſels become tortuous, and the blood is prevented paſſing: but in inſpiration, the air veſicles being dilated, the tortuous veſſels are elongated, and a free paſſage afforded to the blood. The very delicate coats of theſe veſſels are rendered ſo thin as to ſuffer a *chemical action* to take place between the air in the veſſels and the blood in the veſſels. This conſtitutes the primary uſe of reſpiration, viz. the blood abſorbing the oxygen from the atmoſpheric air, by which the nervous energy is increaſed, and, it is generally believed, heat generated;—but this ſubject is yet undetermined.

PERICARDIUM.

A membranous ſac ſurrounding the heart.

It ADHERES to the diaphragm, pleura, ſternum, cartilages of the ribs, œſophagus, aorta deſcendens, and the veins and great arteries going to and from the heart.

ARTERIES. Branches of the internal mammary and mediaſtinal.

VEINS, empty themſelves into the internal mammary.

NERVES. From the ſuperficial cardiacs.

USE. To contain the heart, and to ſeparate a fluid which may lubricate and preſerve it from concretion with the pericardium.

DISEASED APPEARANCES. Inflammation—a coat of coagulated lymph on the internal membrane—adheſions to the heart—dropſy of the pericardium, or *hydro cordis*—ſcrophulous tumours adhering to the pericardium—pericardium wanting.

THE ADULT HEART.

The Heart is a hollow muſcular viſcus, ſituated in the cavity of the pericardium, by whoſe contractile power the blood is ſent to every part of the body.

It is diſtinguiſhed in the dead body, whilſt in the pericardium, into an anterior and poſterior ſurface and margins; a baſe from which the large arteries emerge, and an apex.

In the living body, the baſe of the heart is towards the dorſal vertebræ; its apex towards the ſixth rib of the left ſide ; ſo that its ſituation is oblique, not tranſverſe ; the right ventricle being anterior, the left poſterior, and the inferior ſurface lying upon the diaphragm.

The heart is diſtinguiſhed into two auricles, which lie upon its baſe ſurrounding the larger arteries ; two ventricles, or cavities, in the internal part ; and the arteries and veins going from and terminating in it.

The RIGHT AURICLE is a large muſcular ſac, in which the ſuperior vena cava, and the inferior, terminate : it has a little proceſs, or *cul de ſac*, like an *auricula*, or little ear, from which it took its name, and an opening at its bottom into the right ventricle.

In the right auricle are the following :

1. The *tuberculum Loweri*. A mere projection in the auricle, between the two venæ cavæ.

2. The *valve of Euſtachius*. A production of the inner membrane of the inferior vena cava, at its termination in the auricle. It is not always preſent, but in moſt inſtances is as complete a valve as any other.

3. The fleſhy bundles croſſing the auricle like the teeth of a comb, called *muſculi pectinati*. Between theſe faſciculi the auricle is tranſparent and membranous.

4. The *valve of the great coronary vein*, which opens into this auricle.

5. Around the opening of the auricle into the right ventricle, and rather within the auricle, is a *tendinous circle*.

6. A *flat*, *membranous*, *oval depreſſion*, more remarkable in ſome than in other hearts : which points out the former ſituation of the foramen ovale.

7. The *foramina Thebaſii* ; which are ſeldom ſeen. They are the minute openings of arteries or veins into the right auricle.

The RIGHT VENTRICLE is a large cavity within the heart, and below the auricle. The right auricle opens into it, and a large artery, the pulmonary artery, emerges from it. In this cavity are to be noticed—

1. The muſcular pillars or columns, called *carneæ columnæ*, which croſs one another in every direction, and have deep grooves between them.

2. The *cordæ tendineæ*, which connect ſome of the carneæ columnæ with the valves, and inſert others into the parietes of the heart.

3. The *tricuſpid*, or *triglochin* valves, which ariſe from the tendinous circle, around the opening of the auricle, into the ventricle, and form three points, which are faſtened by the cordæ tendineæ to the parietes of the right ventricle.

4. The reticulated appearance of the carneæ columnæ, and the ſmooth ſurface leading to the artery.

5. Three ſemilunar valves placed juſt within the pulmonary artery. In the middle of each valve is a hard knob, called *corpus ſeſamoideum*.

The LEFT AURICLE is not ſo capacious as the right; it has no communication with it in a natural ſtate; yet the foramen ovale, which is always open in the fœtus, ſometimes remains throughout life, or is forced open. The four pulmonary veins open into this cavity. It preſents the faſciculated appearance, or muſculi pectinati, though not ſo ſtrongly as the right auricle. The opening of this auricle into the ventricle is leſs than that of the right auricle, but it is ſurrounded by a tendinous circle in the ſame way.

The LEFT VENTRICLE is leſs than the right; its fleſhy walls, or parietes, are much ſtronger; and it has, like the right, an opening from the auricle, and an artery ariſing from it. In this ventricle we obſerve—

1. The valve ariſing from the circle of the auricular opening, which terminates in two faſciculi of tendons, and hence is called, from its reſemblance to a biſhop's mitre, *valvulæ mitrales*. The two points are connected to the carneæ columnæ.

2. The carneæ columnæ are here remarkably ſtrong and rounded, and the cordæ tendineæ very firm.

3. The ſmooth ſurface towards the arterial opening.

4. The ſemilunar valves, juſt within the artery, or aorta, with the corpora ſeſamoidea in their middle.

From this deſcription of the heart, it appears that the auricles are ſeparated from each other; the partition is termed *ſeptum auricularum*; and that the ventricles are alſo divided the one from the other by a ſtrong fleſhy *ſeptum ventriculorum*.

With regard to the ſtructure of the heart, it is entirely muſcular; its cavities are lined by a ſmooth and very irritable membrane, continued from the internal coat of the arteries and veins, and its external ſurface is covered by a reflection of the internal tunic of the pericardium.

The muſcular fibres conſtituting the heart may be diſtinguiſhed into three layers:

1. The *outermoſt*, which paſs from the baſis of the heart towards its apex, ſurrounding the whole heart.

2. The *middle layer*, which lie below the former, and paſs in a tranſverſe direction. It is by means of this layer that both ventricles appear to be formed.

3. The *internal layer*, which runs very irregularly, its fibres interlacing one another.

The heart is nouriſhed with blood by two *arteries*, branches of the aorta, called coronaries, which return their blood by the coronary vein, into the right auricle. It has *nerves* from the cardiac plexus formed of branches from the par vagum and great intercoſtal; but theſe nerves are not under the influence of the mind, the heart being a muſcle of involuntary motion.

The heart has *abſorbents*, which accompany the direction of the arteries.

The *uſe* of this viſcus is to conſtitute the primary organ of the blood's motion.

DISEASES. Inflammation—abſceſs — gangrene — pus, and coagulated lymph in the cavities—aneuriſm of the ventricle—hydatids in the ventricle—rupture—malformation—unuſually large—oſſification—a depoſition of earthy particles in the muſcular ſtructure—inflammation of the external membrane—a coat of coagulated lymph on it; ſometimes like a honey-comb—oſſification—hydatids adhering to it—pus upon the ſurface—adheſions to the pericardium—a morbid thickening—valves oſſified — earth depoſited in them—thickened—burſt—valves between the auricles and ventricles thickened—oſſified—earthy — the internal membrane of the heart of a florid colour — gangrenous—the coronary arteries oſſified—converted into a cartilaginous ſubſtance.

CIRCULATION OF THE BLOOD.

The blood is continually in motion, paſſing from the auricles of the heart into the ventricles; from the ventricles into all the arteries of the body, and from the arteries into the veins, which return it again to the auricles.

The blood is brought from every part of the body to the heart by the two venæ cavæ (the ſuperior bringing it from the head, upper extremities, and thorax, and the inferior from the abdomen and inferior extremities), which terminate in the right auricle. The right auricle, when diſtended with blood, contracts, and empties itſelf into the right ventricle; the right ventricle then contracts, and propels the blood into the pulmonary artery, the opening between the ventricle and auricle being ſhut by the tricuſpid valves. The pulmonary artery conveys the blood by its numerous ramifications into the ſmall branches of the air-cells of the lungs, where it undergoes a change, and paſſes into the veins, which bring it by four trunks into the left auricle of the heart. It is prevented returning from the pulmonary artery into the right ventricle, by the three ſemilunar valves which are placed at its origin. The blood having thus paſſed through the lungs, and become of a florid colour, diſtends the left auricle, which is then ſtimulated to contract, and pours the blood into the left ventricle. The left ventricle next contracts, and propels the blood through the aorta, to be conveyed by its branches to every part of the body. The mitral valves, which are placed at the auricular opening into the left ventricle, prevent the blood from returning, when the ventricle contracts, into the auricle; and, ſhould the blood be prevented by any impediment paſſing immediately along the aorta, the three ſemilunar valves placed at its origin prevent its regurgitating into the ventricle. From the numerous arteries of the aorta the blood is conveyed into the veins, where it loſes its florid colour and becomes darker, to be returned, in the way above mentioned, to the right auricle.

The blood, therefore, of the right auricle and ventricle, and of the pulmonary arteries, is of a *dark* colour; and that of the pulmonary veins, left auricle, ventricle, and all the arteries (except the pulmonary), of a *florid* hue.

From what has been ſaid, it is evident that the action of the heart conſiſts in the alternate contraction and dilatation of its auricles and ventricles.

The dilatation of the heart is termed *diaſtole*, and the contraction *ſyſtole*.

The exceſſive ſenſibility of the membrane which lines the auricles and ventricles diſpoſes them to contraction, which is effected by the irritation of the ſtimulus of the blood, and by that of the diſtention of its cavities.

OF THE ABDOMEN.

A cavity ſituated between the thorax and pelvis. Divided into ſeveral regions, as has already been mentioned. The EXTERNAL PARTS are the common integuments, five pair of abdominal muſcles, and the peritoneum. The INTERNAL PARTS, or VISCERA, are the omentum, ſtomach, ſmall and large inteſtines, liver, gall-bladder, meſentery, lacteal veſſels, ſpleen, pancreas, kidneys, ſupra-renal glands, aorta *deſcendens*, and vena cava aſcendens.

MORBID APPEARANCES. The diſeaſed appearances of the viſcera will be enumerated under their reſpective heads. The cavity of the abdomen is ſubject to *aſcites abdominalis*, and a complete adheſion between all its viſcera, ſo as totally to obliterate the cavity.

Parts of the viſcera have protruded through the umbilicus, inguinal ring, diaphragm, &c. forming various ſpecies of *herniæ*.

OPERATIONS. *Paracenteſis abdominis*, to remove the fluid in dropſy, and the operation for ſtrangulated, umbilical, inguinal, and femoral herniæ.

PERITONEUM.

A ſmooth delicate membrane lining the internal ſurface of the abdomen, and covering all its viſcera. It is *connected*, by means of cellular membrane, with the diaphragm, abdominal muſcles, vertebræ of the loins, bones of the pelvis, urinary bladder, uterus, inteſtinum rectum, and all the viſcera of the abdomen.

VESSELS OF THE PERITONEUM, from the adjoining parts.

USE. To contain and ſtrengthen the abdominal viſcera, and to exhale a vapour to lubricate them.

MORBID APPEARANCES. An accumulation of the fluid thrown out to lubricate the viſcera, conſtitutes *aſcites abdominalis*—*Coagulable lymph* is often ſeparated into the abdomen in large quantities by the veſſels of the peritoneum—pus alſo has been obſerved. Inflammation of the peritoneum is termed *peritonitis*. The other diſeaſed appearances are adheſion, thickening, dark ſpots on the peritoneum, a white, ſoft, granulated matter adhering to the peritoneum, cancerous tumours, hydatids, air in the cavity of the peritoneum, or *tympanites*.

OPERATIONS. *Paracenteſis abdominis*, to remove the fluid in dropſy, and gaſtroraphy, or ſewing of the abdomen.

OMENTUM.

The omentum, or epiploon, is an adipoſe membrane, a production of the peritoneum, attached to the ſtomach, and lying on the anterior ſurface of the inteſtines.

It is DIVIDED into *large* and *ſmall* omentum. The *former* hangs pendulous from the great curvature of the ſtomach. The ſmall omentum fills up the ſpace between the ſmall curvature of the ſtomach and liver.

Immediately behind the biliary ducts there is an opening in the omentum, which will admit the finger, called the *foramen of Winſlow*. The omentum is ſupplied with *arteries* by the cœliac artery. The *veins* empty themſelves into the vena portæ.

Uſe. To lubricate the inteſtines, keep them warm, and to preſerve them from concretion.

Diseased appearances. Inflammation, which is called *omentitis*, or *epiploitis*—bony and earthy matter in the omentum—ſcirrhous enlargement like a bunch of grapes—contracted omentum—adheſions with various parts. When the omentum paſſes through the parietes of the abdomen, the rupture is termed an *epiplocele*.

Operation. The removal of a gangrenous portion, either from ſtrangulated hernia or rupture of the abdomen.

STOMACH.

A membranous receptacle, *ſituated* in the epigaſtric region, which receives the ingeſta from the œſophagus. It is *divided*, when empty, into an anterior and a poſterior ſurface; a great and little curvature; the *cardia*, or ſuperior opening; and the *pylorus*, or inferior opening.

Connexion, with the œſophagus, duodenum, omentum, and pancreas.

It is **composed** of three membranes, or coats, viz. a peritoneal, muſcular, and villous coat.

Arteries, branches of the cœliac—the *coronaria*, which goes to the ſmall curvature—the *gaſtrica ſiniſtra*, which is diſtributed to the great, and ariſes from the ſplenic artery—*gaſtrica dextra*, which paſſes to the great curvature—and the *pylorica*, ſupplying the pylorus; all of which unite with each other, and form a net-work of blood-veſſels.

The **gastric veins** empty themſelves into the vena portæ, correſponding with the trunks of the arteries.

The **nerves** of the ſtomach are branches of the par vagum.

Absorbents. Thoſe of the ſmall curvature terminate in the thoracic duct, where the cœliac artery is given off, and thoſe paſſing along the great curvature join with the abſorbents of the ſpleen.

Glands, muciparous, under the internal tunic.

Use. To receive the ingeſta from the œſophagus, and to retain, mix, digeſt, and expel it into the duodenum.

Diseased appearances. Inflammation, which is termed *gaſtritis* — ulceration — ſcirrhus — cancer — partly diſſolved by gaſtric juice—tumour filled with a ſuetty ſubſtance in the ſtomach — calculi in the ſtomach — hernia of the ſtomach termed *gaſtrocele*—abſceſs between the peritoneum of the parietes and ſtomach burſting into the latter—coagulated lymph thrown out in the ſtomach—pouch formed in the ſtomach—a morbid contraction of the whole ſtomach—worms in the ſtomach.

DIGESTION.

Chymification.

Digeſtion, or chymification, is that change the food undergoes in the ſtomach, by which it is converted into chyme.

The circumſtances neceſſary to effect a healthy digeſtion of food are—

1. A certain degree of heat of the ſtomach.
2. A free mixture of ſaliva with the food in the mouth.
3. A certain quantity of healthy gaſtric juice.
4. The natural periſtaltic motion of the ſtomach.
5. The preſſure of the contraction and relaxation of the abdominal muſcles and diaphragm.

From theſe circumſtances, the particles of the food are ſoftened, diſſolved, diluted, and intimately mixed into a ſoft pap, called chyme, which paſſes through the pylorus of the ſtomach into the duodenum, where the nutritious part is ſeparated from it and abſorbed by the lacteals. See *Chylification.*

INTESTINES.

The membranous tube, ſix times longer than the body, in the cavity of the abdomen, variouſly contorted from the pylorus of the ſtomach to the anus, is ſo called.

DIVISION, into ſmall and large inteſtines.

The SMALL are the *duodenum*, which begins at the pylorus of the ſtomach, and is reflected over the ſpine under the peritoneum. It is about twelve fingers breadth in length, and has an oblique perforation near its middle, which is the common opening of the pancreatic duct and ductus communis choledochus. The *jejunum* and *ileum* compoſe the remainder of the ſmall inteſtines. They always hang from the meſentery into the cavity of the pelvis. There is no alteration of ſtructure in any part of the ſmall inteſtines; the termination of the one and beginning of the other is imaginary. The jejunum conſtitutes the firſt half from the duodenum, the other half is ileum. The ſmall inteſtines have internally a number of annular folds, which augment the ſurface for the ſituation of the lacteal and other veſſels; theſe are called *valvulæ conniventes*, and are peculiar to the ſmall inteſtines.

The LARGE Inteſtines are divided into the cæcum, colon, and rectum. The *cæcum* lies upon the right hip over the iliacus internus muſcle, to which it is attached by cellular membrane; it is a large *cul de ſac:* the ſmall inteſtine opens obliquely into it, in ſuch a manner as to form a valve to impede the return of the fæces; and nearly oppoſite to this valve there ariſes from the cæcum a ſmall vermiform canal, imperforated at its extremity, called the *appendicula cæci vermiformis*. The aſcending portion of the large inteſtine is the colon; it proceeds towards the liver by the name of the *aſcending portion of the colon*, and having reached the liver, forms a *tranſverſe arch* acroſs to the other ſide. The colon then deſcends, forming what is termed its *ſigmoid flexure* into the pelvis, where the gut is termed the *rectum*, which terminates in the anus. The large inteſtines are lobulated; have ſometimes little fat portions adhering to them called *appendiculæ epiploicæ*, and alſo three longitudinal *bands* upon their external ſurface.

Composed of three membranes, or coats; one peritoneal, a muſcular one, and the third which is villous.

Connexion, with the meſentery, kidnies, os coccygis, and urinary bladder, and in women with the vagina.

Arteries, branches of the ſuperior and inferior meſenteric, duodenal, and internal hæmorrhoidal.

Veins, run into the meſeraic, which go to the vena portæ.

Nerves, productions of the eighth pair and intercoſtals.

Lacteal vessels. Theſe ariſe from the ſmall inteſtines, and run into the meſenteric glands.

Glands, muciparous, under the villous coat.

Use, to receive the chyme, and retain it for a time; to mix it with the enteric juice and bile; to ſeparate and propel the chyle into the lacteal veſſels; and to eliminate the fæces.

Diseased appearances. Inflammation, which is called *enteritis*—ulceration—mortification—abſceſſes—intus ſuſception—ſtricture—ſcirrhus—cancer—a morbid thickening of the coats of the inteſtines—a morbid tranſparency of the inteſtine—the inner membrane of the large inteſtine formed into white and yellow tubercles—the folds of the inner membrane of the great inteſtine enlarged and loaded with blood—little proceſſes of the inner membrane a little above the anus—hæmorrhoids—pouches in the ſmall inteſtines—worms; aſcaris vermicularis, aſcaris lumbricoides, trichuris, tæniæ oſculis ſuperficialibus; and tæniæ oſculis lateralibus—thickening of the valvulæ conniventes—calculi in the inteſtines—lacteals morbidly diſtended with chyle—ſmall tubercles hanging from the inteſtines into the cavity of the abdomen—adheſions of all the inteſtines into one maſs.

OPERATIONS. Operation for ſtrangulated inteſtinal hernia and wounds of the inteſtine.

CHYLIFICATION.

This is the change of the chyme in the ſmall inteſtines into chyle. The chyme in the duodenum is mixed with the pancreatic juice, the bile, and enteric juice; from which mixture, effected by the continual periſtaltic motion of the inteſtines, a milk-like fluid is ſeparated, termed chyle, which is abſorbed by the pendulous openings of the lacteals, and conveyed through the meſentery into the thoracic duct, to be ſent into and mixed with the blood, to form new blood.

Chylification is performed quicker than chymification, and both are effected within three hours.

The excrementitious particles of the food, called the fæces, are propelled into the cæcum, through the colon, where they acquire a peculiar ſmell, into the rectum, to be expelled.

EXPULSION OF THE FÆCES.

The irritation of the fæces in the rectum induces it to contract, the ſphincter relaxes, and the fæces are protruded through the aperture of the anus, by the preſſure of the abdominal muſcles, and the anus cloſed again by the contraction of its ſphincter and levator muſcles.

MESENTERY.

The meſentery is a membranous production, formed of two laminæ of peritoneum; between which are a quantity of cellular or adipoſe membrane, numerous glands, lacteals, lymphatics, arteries, veins, and nerves. It is diſtinguiſhed into, *meſentery,*

ſentery, which adheres to the three ſuperior lumbar vertebræ, and has the ſmall inteſtines hanging to it; *meſocolon*, which ſupports the colon; and *meſorectum*, a portion in the pelvis, encloſing the rectum.

The meſenteric *arteries* are branches of the aorta: they paſs within the duplicature of the meſentery to the inteſtines.

The veins accompany the ſmaller ramifications, but empty their blood into the vena portæ.

The *nerves* of the meſentery are from the par vagum and great intercoſtals; they form a number of plexuſſes, which ſend off twigs to the inteſtines.

The *glands* are very numerous: the lacteals proceed from the inteſtines into theſe glands, and from them to the thoracic duct.

The *uſe* of the meſentery is to ſuſtain the inteſtines and afford them a peritoneal coat, and to give a paſſage to the meſenteric veſſels.

Diseases. Inflammation of its laminæ, called *peritonitis meſenterii*—thickening of the laminæ of the meſentery—inflammation of the meſenteric glands called *meſenteritis*—abſceſs—ſcirrhus—ſcrophulous enlargement—cancer—an earthy depoſit in the glands—oſſification—*emphyſema*, or air in the meſentery—anaſarca of the meſentery—aneuriſm of the meſenteric artery—hydatids adhering to the meſentery—a puckering or contraction of the meſentery.

LIVER.

The liver is the largeſt of all the abdominal viſcera; it is of a deep red colour, and ſituated in the right hypochondriac region, and ſomewhat in the epigaſtric, hanging by its ligaments from the diaphragm.

The liver is convex above and concave below; it is extremely broad ſuperiorly, but gradually becomes thinner in-

feriorly,

feriorly, and ends in a thin margin. Its ſurfaces are ſmooth, being covered by the peritoneum, which forms its ſeveral ligaments, viz. two which are attached to the diaphragm and are termed *lateral*; in the middle of its lower and anterior margin is a *round ligament* adhering to the navel, through which the umbilical vein, &c. of the fœtus paſſed; between the round ligament and the diaphragm is another, called the *ſuſpenſory ligament*, which adheres to the peritoneum of the anterior part of the abdomen.

Division. Into three *lobes*, one of which is very large, the other ſmaller, and a third, which is very ſmall, and called after its deſcriber *Spigelian*, or *lobulus Spigelii*.

Substance. The liver is a gland compoſed of arteries, veins, nerves, lymphatics, and excretory ducts, united together by a particular ſubſtance: there is alſo an appendage on the concave ſurface of the liver called the gall-bladder.

The *artery* of the liver is the hepatic, which nouriſhes it: the blood it conveys does not appear to contribute any thing towards the formation of bile. It is returned into the venæ cavæ hepaticæ.

The *vena portæ* is a large vein which conveys the blood from the ſpleen, meſentery, and ſtomach, into the liver. As it enters the liver it receives a ſtrong tunic, which is termed the capſule of Glyſſon, and divided into innumerable branches, which, at their very minute ends, form an immenſe number of veſſels, arranged like the hairs of a pencil bruſh, and hence called *penicilli*. Theſe penicilli conſtitute the glandular fabric and bulk of the liver. From each penicillus ariſes a ſmall duct which runs to a larger; this again unites with others, till at length they form veſſels of a conſiderable ſize, which ultimately end in one duct. The ſmaller ducts are termed *pori biliarii*, and its trunk *ductus hepaticus*. The ſmall branches of the vena portæ open alſo into correſponding veins, which gradually become larger, and return the blood into the vena cava at the ſuperior part of the liver: theſe are called *venæ cavæ hepaticæ.*

From this deſcription of the ſubſtance of the liver, the phyſiology of its functions may be explained. The liver is deſtined to ſeparate bile from the blood. The blood is brought for this purpoſe by three large venal trunks from the ſtomach, omentum, ſpleen, large and ſmall inteſtines; which three trunks become one; the vena portæ, which conveys the blood to its penicillated ends, which penicilli, or glands, ſeparate bile from it; and the bile paſſes into the beginnings of the pori biliarii, and along them into the ductus hepaticus. The blood which is not wanted for this purpoſe, and that from which bile has been ſeparated, then paſſes into the venæ cavæ hepaticæ; ſo that the vena portæ takes on the action and function of an artery, and, like an artery, its branches gradually become ſmaller.

The *nerves* of the liver are very numerous, ariſe from the hepatic plexus, and go into the ſubſtance of the liver with the hepatic artery.

The *abſorbents* of the liver are ſuperficial and deep-ſeated: the former are always ſeen very beautifully arboreſcent on the peritoneal coat; they paſs through the diaphragm, and over the gall-bladder to the thoracic duct.

Diseased appearances. Inflammation of the peritoneal coat—general adheſions—partial converſion into cartilage—oſſification—abſceſs between the peritoneum of the liver and integuments—inflammation of the liver called *hepatitis*—abſceſs—mortification—tubercles of ſeveral kinds—morbid flaccidity—morbid firmneſs—general contraction—hydatids—cyſts containing calcareous matter—worms in the pori biliarii.

GALL-

GALL-BLADDER.

An oblong membranous receptacle, ſituated under the liver, to which it adheres very firmly, in the right hypochondrium.

It is *divided* into bottom, body, and neck, which terminates in the ductus cyſticus.

The *ductus cyſticus* ariſes from the gall-bladder, proceeds towards the duodenum, and unites with the *ductus hepaticus*, to form the *ductus communis choledochus*, which perforates the duodenum, and conveys the bile into the inteſtines.

The gall-bladder is COMPOSED of three membranes, a common, fibrous or muſcular, and villous.

ARTERIES, branches of the hepatic.

VEINS, empty themſelves into the vena portæ.

ABSORBENTS, very numerous.

NERVES, from the eighth pair and intercoſtals.

GLANDS, muciparous.

USE, to retain the gall, which regurgitates from the hepatic duct, there to become thicker, more bitter, and acrid.

DISEASED APPEARANCES. Inflammation—adheſions—ſcirrhus—oſſification—morbidly tranſparent—morbidly thickened—gall-ſtones—hydatids—ſtricture of the ducts—pouch in the gall-bladder.

SPLEEN.

A ſpongy viſcus of a bluiſh red colour, ſituated in the left hypochondrium, near the fundus of the ſtomach, under the ribs. FIGURE, oval. CONNEXION, with the omentum, diaphragm, pancreas, and colon. ARTERIES, the ſplenic artery is a branch of the cœliac. VEINS, empty themſelves into the vena portæ. ABSORBENTS, rarely ſeen. NERVES, from the par vagum and great intercoſtal. USE, unknown.

PANCREAS.

A glandular body, of a long figure, compared to a dog's tongue, ſituated in the epigaſtric region, under the ſtomach.

It is *compoſed* of innumerable ſmall glands, the excretory ducts of which unite and form the pancreatic duct.

Its external membrane is from the meſocolon.

Arteries, from the neighbouring parts and ſplenic artery.

Veins, evacuate themſelves into the ſplenic.

The *pancreatic duct* perforates the duodenum with the ductus communis choledochus, and conveys its ſecretion into the inteſtines.

Use, to ſecrete a humour ſimilar to ſaliva, and carry it into the duodenum.

Diseased appearances. Inflammation—morbid ſoftneſs—morbid hardneſs—abſceſs—calculi of the pancreas—worms—pancreas wanting.

LACTEAL VESSELS.

The abſorbent veſſels of the meſentery which convey the chyle, a milk-like fluid, from the inteſtines into the thoracic duct.

They *originate* from the ſurface of the duodenum, jejunum, and ileum, and *terminate* in the thoracic duct, or trunk of the abſorbents, which runs near the aorta on the ſpine, and empties its contents into the jugular vein.

As they run through the meſentery, they paſs through a number of glands, in which the chyle is altered, and then proceed to their trunk.

Use, to carry the chyle from the inteſtines into the blood.

Diseased appearances. Lacteals diſtended with inſpiſſated chyle—rupture of the lacteals.

KIDNIES,

Two ſomewhat oval viſcera, *ſituated* behind the ſac of the peritoneum, near the bodies of the ſuperior lumbar vertebræ, which ſecrete the urine.

DIVISION. Into three kinds of ſubſtances: a *cortical*, which is external and very vaſcular; a *papillous*, which ends in ſeveral *papillæ* or nipples in the pelvis; a *tubular*, which goes from the cortical to the papillous ſubſtance: and into a hollow part called the *pelvis*, lined by a ſmooth membrane, termed the pelvis of the ureter, which end in the ureter.

INTEGUMENTS, adipoſe membrane, and a membrana propria.

The RENAL ARTERIES, or EMULGENTS, are branches of the aorta deſcendens; they ramify very beautifully in the ſubſtance of the kidney, and terminate in *cryptæ*, or convolutions of the artery upon itſelf.

The VEINS empty themſelves into the cava inferior.

The NERVES of the kidnies are branches of the eighth pair and intercoſtal.

The excretory ducts of the kidnies are called the URETERS; canals which convey the urine from the kidnies into the bladder.

USE, to ſecrete urine, and convey it to the bladder.

DISEASED APPEARANCES. Inflammation—abſceſs—gangrene—morbid ſoftneſs—ſcirrhus—hydatids—converted into an earthy matter—calculi in the pelvis of the ureter—oſſification—total deſtruction of the kidney by enlargement of the pelvis of its ureter—ulcerated ſurface of the pelvis of the kidney—kidney converted into cyſts or hydatids.

EXCRETION OF THE URINE.

The urine is ſeparated from the blood by the extremities of the renal arteries, or *cryptæ*, which open in the ſubſtance of the kidney into the *tubuli uriniferi*, from whence it is received into the pelvis of the kidney, and paſſes along the ureter into the urinary bladder guttatim, where it uſually remains a few hours, in conſequence of the ſphincter of the bladder being contracted It is prevented returning into the ureters by their entrance being oblique and valvular. The urine having remained a few hours in the bladder, excites a deſire to void it, by which ſtimulus the ſphincter becomes relaxed, the muſcular ſtructure of the bladder contracts, and by the aſſiſtance of the abdominal muſcles and the acceleratores urinæ the urine is propelled along the urethra.

SUPRA-RENAL GLANDS.

Renal capſules. Renal glands.

Two triangular flat bodies, ſituated one above each kidney. They are covered by a proper membrane, and anteriorly by the peritoneum. In an healthy ſtate they have a ſmall cavity in which there is a browniſh fluid. They are plentifully ſupplied with arteries from the diaphragm, aorta, and renal arteries, from which circumſtance one would ſuppoſe they were to anſwer ſome purpoſe in the animal economy, although unknown. Their veins paſs into the cava and renal vein, and their abſorbents and nerves are in common with thoſe of the kidneys. No excretory duct has yet been detected, nor is their uſe known.

DISEASED APPEARANCES. The ſupra-renal glands are frequently found containing a black aqueous fluid—inflamed—enlarged—filled with ſcrophulous abſceſſes—converted into a ſpongy ſubſtance, whoſe cells are diſtended with an aqueous fluid, containing ſmall calculi of various forms and colour.

OF THE PELVIS.

The pelvis is a cavity below the abdomen, and under the pubes, containing the urinary bladder, rectum, and organs of generation.

VESICA URINARIA.

The urinary bladder is a membranous ſac in the pelvis without the peritoneum, which, in part, gives it a coat or tunic. It is ſituated in men between the pubes and rectum; in women between the pubes and uterus, being fixed at its anterior and inferior part to the arch of the pubes by its neck and the urethra.

Anatomiſts divide the urinary bladder into a *fundus*, which is looſe in the abdomen, and, when the bladder is diſtended, reaches the navel and even the ſtomach; a *neck*, before which the proſtate gland is placed in men; and a *body*, or that part compoſing the chief bulk of the bladder, diſtinguiſhed by an anterior and poſterior part and ſides.

The anterior half of this dilatable baſe is connected inferiorly in man to the rectum, and in women to the uterus: its middle part to the bones of the pelvis by means of cellular membrane and muſcular fibres; and its ſuperior part is attached looſely to the muſcles of the abdomen.

It is *compoſed* of three membranes, like the inteſtines. Its *arteries*, are branches of the hypogaſtric and hæmorrhoidal.

The VEINS empty themſelves into the hypogaſtric.

The NERVES of the bladder are branches from the intercoſtal and ſacral nerves.

Its internal ſurface is lubricated by mucus ſeparated from muciparous glands under its internal coat.

The *uſe* of the bladder is to receive, retain, and expel the urine brought into it by the ureters, which perforate its inferior part near the neck of the bladder.

DISEASED APPEARANCES. Inflammation—ſcirrhus—cancer—gangrene—ulceration—fungous and cancerous excreſcences—polypus—puckering of the internal membrane—muſcular fibres concentrated into bundles—morbid contraction—pouches of the bladder—calculi of various kinds in the bladder—enlarged openings of the ureters—hydatids in the bladder—aſcarides in the bladder.

OPERATIONS. Lithotomy—puncturing the bladder in ſuppreſſion of urine—paſſing the catheter into the bladder—veſicæ lotura.

THE MALE ORGANS OF GENERATION.

Theſe are, the penis, teſticles, and veſiculæ ſeminales.

PENIS.

The penis, called alſo *membrum virile*, or yard, is that cylindrical part which hangs down under the mons Veneris, before the ſcrotum. It is *divided* into root, body, and head, called *glans*.

The hairy prominence, which covers the pubes, is called *mons Veneris*.

SUBSTANCE. The penis conſiſts of common integuments, two corpora cavernoſa; the corpus ſpongioſum urethræ; and the urethra.

The *corpora cavernoſa*, which form the chief bulk of the penis, are compoſed of a cellular and very elaſtic ſubſtance, and ariſe by two crura, one from each aſcending ramus of the iſchium. At their origin they are firmly attached to the bone by a denſe cellular membrane; they then converge towards the pubis, where they are alſo firmly connected to the ſymphyſis by a denſe cellular membrane. About this place they meet and paſs together, but do not unite, forming the greater part of the penis, and end abruptly behind the *corona glandis*. The corpora cavernoſa, being each ſomewhat round, and lying together in the penis, a conſiderable excavation is left above and below; in the former the great vein of the penis paſſes, and in the latter the corpus ſpongioſum urethræ.

The *corpus ſpongioſum* begins before the proſtate gland, and ſurrounds the urethra. At its beginning it forms the bulbous part of the urethra, and then proceeds forwards in the ſpace between the two corpora cavernoſa on the under ſurface, and is expanded at the extremity of the penis into a very vaſcular ſubſtance, called *glans penis*, naturally covered by a fold of the ſkin, called the *prepuce*, which, at the under part of the glans, is fixed to it by a *frænum*.

The *urethra* is a membranous canal, which proceeds from the bladder, through the proſtate gland and the corpus ſpongioſum urethræ; and at the end of the glans penis its internal membrane is reflected over the glands forming the meatus, or opening in the glans. The urethra is endowed with a high degree of ſenſibility and contractility. In the urethra are to be obſerved, the *verumontanum*, or *caput gallinaginis*, a cutaneous eminence in the urethra, about an inch before the neck of the bladder—the openings of the ejaculatory ducts around the caput gallinaginis—the opening of the ducts of the proſtate and Cowper's glands—the *lacunæ* or openings of the ducts of the mucous glands of the urethra.

GLANDS. Muciparous—odoriferous—Cowper's glands—and the proſtate. See Adenology.

Arteries. The penis is ſupplied with blood by the pudical artery, which is continued to the ſymphyſis of the pubis, where it pierces the cavernous ſubſtance, and divides into ſeveral branches, one going to the bulb of the urethra, another along the dorſum of the penis, and two branches enter the cells of the corpora cavernoſa, and, by filling them with blood, cauſe an erection of the penis.

Veins. The blood of the penis is returned by a large vein, called the *vena magna ipſius penis*, which conveys it to the hypogaſtric vein.

Absorbents. The lymphatics of this organ are deep-ſeated and ſuperficial. The *ſuperficial* ariſe from the prepuce in three diviſions: one on the right ſide of the frenum, another on the left, and a third directly on the middle of the ſuperior ſide. Thoſe from the under ſide make a ſemicircular turn from the under to the upper ſide of the penis, whilſt that on the ſuperior ſide of the prepuce runs on the middle of the back of the penis, exactly in the direction of the ſymphyſis pubis. At a little diſtance from the pubis the three diviſions unite into one common trunk, which almoſt immediately ſeparates again into two; one, going to the right groin, accompanies the veins going to the inguinal vein, and terminates near it in thoſe inguinal glands which are neareſt the ſymphyſis pubis. The other trunk goes to the left groin, and terminates exactly in the ſame manner as the former. The *deep-ſeated* lymphatics accompany the arteries, and paſs with them on the inſide of the tuberoſities of the iſchia, or under the angle of the pubis.

Nerves. Branches of the ſacral and iſchiatic. Thoſe diſtributed on the integuments and body of the penis are for common ſenſation; thoſe which go to the *glans penis* are for the peculiar ſenſe of that part.

The uſe of the penis is for erection, coition, effuſion of ſemen, and of urine.

DISEASED APPEARANCES. Inflammation—ulceration, which, when cauſed by the venereal virus, is called a *chancre*—abſceſs—gangrene—phymoſis—paraphymoſis—elephantiaſis—varix—anaſarca—cancer—warts, or excreſcences, from venereal or other cauſes—original mal-formation.

Urethra. Gonorrhœa—leucorrhœa—enlarged lacunæ—ſtricture, which is either a general contraction for a greater or leſs ſpace; or a conſtriction, like as if a piece of packthread were tied round the urethra; or a fine pellicle, or a caruncle—an artificial urethra—fiſtula—no meatus urinarius—urethra converted into bone.

OPERATIONS. Amputation—circumciſion—dividing the prepuce in phymoſis and paraphymoſis—opening concreted lips of the meatus urinarius—paſſing a bougie—catheteriſm—application of cauſtic bougies—removing excreſcences.

TESTES.

The teſticles are two oval bodies, ſituated originally within the cavity of the abdomen, from which they deſcend before birth, or ſoon after, into a bag, called the ſcrotum, placed under the root of the penis.

SUBSTANCE. The adult teſticle is compoſed of arteries, veins, and a peculiar ſet of veſſels, which ariſe from the minute terminations of the arteries. This peculiar ſet of veſſels are—

1. The *vaſa recta*, which are found in the ſubſtance of the teſticle, ariſing from the minute ramifications of the ſpermatic arteries. At the top of the teſticle the ſtraight veſſels, which are the commencement of the excretory ducts, juſt as the biliary pores are of the ductus hepaticus, inoſculate with one another, and form

2. The *rete vaſculoſum teſtis.* This plexus of veſſels ſends off at the ſuperior part of the teſticle,

3. The *vaſa efferentia*; which are ten or more in number. They paſs from the body of the teſticle, and ſoon uniting into one trunk, called *vas deferens*, form, by an immenſe number of convolutions, a ſomewhat hard ſubſtance, called the

Epididymis. This is ſomewhat pyramidal, having a thin convex head, and a flat thin extremity; it is formed merely of a convolution of the vas deferens, or excretory duct of the teſticle.

Vas deferens. This long but ſmall duct is formed of a cartilaginous ſubſtance; its cavity is not ſufficiently large to admit a ſmall pin. It paſſes from the end of the epididymis in a zig-zag manner up by the ſide of the pubes, where it is no longer convoluted, but proceeds ſtraight into the cavity of the pelvis to the veſiculæ ſeminales.

Coverings. The teſticle has a ſtrong, white, denſe tunic, intimately connected to it; this is called the *tunica albuginea teſtis.* It completely encompaſſes the body of the teſticle, and advances over the epididymis.

The next tunic of the teſticle is called *tunica vaginalis.* Anatomiſts conſider it as a production of the peritoneum; but this opinion does not appear to be well founded. It is a delicate membranous bag, connected externally by cellular ſtructure to the dartos; and the teſticle, with its tunica propria or albuginea, adheres firmly to its outſide, puſhing itſelf, as it were, into it, in the ſame way as the heart into the pericardium, the lungs into the pleura, &c.; ſo that, when the tunica vaginalis is opened, the teſticle is ſeen within it.

The *dartos* has already been deſcribed in Myology.

All theſe coverings of the teſticle are ſurrounded by a very elaſtic cellular membrane and common integuments, to which the name of *ſcrotum* is given.

Arteries. The ſpermatic arteries, formerly termed *vaſa preparantia*, ariſe on each ſide from the aorta, near the emulgents, and ſometimes from the emulgent, eſpecially on the right ſide. The reaſon of the origin of theſe arteries being ſo remote from the teſticles will appear from conſidering the ſituation of thoſe organs originally. When the ſpermatic artery reaches the abdominal ring, it is ſurrounded by the vas deferens, the ſpermatic veins, and a quantity of cellular membrane; all theſe together are called the *ſpermatic cord*, which paſſes through the ring.

Veins. The blood of the ſpermatic arteries is returned by a number of ſmall venal branches from the teſticles, which enlarge as they paſs up the cord. Having paſſed through the abdominal ring, they form a plexus around the ſpermatic artery, to which the term *corpus pampiniforme* is given.

Absorbents. The lymphatics are diſtinguiſhed into thoſe of the integuments, thoſe of the body of each teſticle, thoſe of the rete teſtis, and thoſe of the epididymis; all of which proceed along the cord.

Nerves. The renal plexus of nerves ſends off ſeveral branches to the teſticles, as do alſo the meſenteric plexus, and the great intercoſtal, all of which accompany the ſpermatic artery. The ſcrotum is ſupplied by branches from the third and fourth lumbar nerves.

Descent of the testicle. The teſticles are always originally ſituated within the cavity of the abdomen. About the ſeventh month they generally leave that cavity, and paſs through the abdominal ring into the ſcrotum. There is, however, great variety in the time of their deſcent, and caſes are recorded, wherein they did not appear during the whole courſe of the perſon's life. When in the cavity of the abdomen, each teſticle is connected to the ſcrotum by a ligamentous ſubſtance, and there is a ſmall pyramidal body at its beginning, cloſe to the teſticle, which, from its appearing to direct the courſe of the teſticle, is called *gubernaculum teſtis*.

Diseased appearances. Inflammation, which is termed *orchitis*, or *hernia humoralis*—ſuppuration—gangrene—ſcirrhus—ſcrophulous enlargement—pulpy—cancer—converted into cartilage—oſſified—ſmall and waſted—*hydrocele*—*hæmatocele*—*pneumatocele*—cavity of the tunica vaginalis obliterated—filled with hydatids—the epididymis ending in a cul de ſac—ſcrophulous thickening—ſcrophulous tumours—ſtricture—the ſpermatic veins varicoſe, called *varicocele*—the ſpermatic cord hardened—anaſarcous—containing large cyſts of water—cancer of the ſcrotum, peculiar to chimney-ſweepers.

SECRETION AND EXCRETION OF THE SEMEN.

The ſemen is ſecreted by the minute branches of the ſpermatic arteries that depoſit it into correſponding ſeminal veſſels, called *vaſa recta*, which compoſe the greater part of the body of the teſticle. The ſemen is the proper ſtimulus to theſe veſſels, which are therefore ſtimulated to contract, and, by a very ſlow motion, convey it into the *vaſa efferentia*, which terminate in the epididymis. The vas deferens carries it through the inguinal ring into the pelvis, to be depoſited in the veſiculæ ſeminales, where it excites a deſire to emit it.

The cells of the corpora cavernoſa penis are diſtended with blood by the venereal ſtimulus; hence the penis ſwells, and is inclined for coition, during which action, at the time of the *aſtrum venereum*, the veſiculæ ſeminales contract, and the ſemen is thrown with an immenſe force through the ejaculatory ducts, opening into the urethra, where it is mixed with the ſecretion from the proſtate gland, which is expelled at the ſame moment, and paſſes with it along the urethra, to be propelled by the contraction of the ejaculatory muſcles into the cavity of the uterus.

VESICULÆ SEMINALES.

Two white membranous receptacles, ſituated on the back part of the bladder, cloſe to its neck, which receive and contain the ſemen from the vaſa deferentia.

Substance. Membranous, white, and reſembling in their ſtructure an inteſtine variouſly contorted, and covered with a fibrous ſubſtance. Each veſicula ſeminalis ſends forth a duct, which paſſes through the proſtate gland, and are called the *ejaculatory ducts*; they are ſome lines long, and enter the cavity of the urethra by a peculiar orifice at the top of the verumontanum.

Vessels and nerves. From the neighbouring parts.

Absorbent vessels. Theſe ariſe from the veſiculæ ſeminales, and run to the lymphatic glands about the loins.

Use. To contain, retain, inſpiſſate, and excern the ſemen into the urethra.

Diseased appearances. Morbid adheſions to neighbouring parts—wholly converted into a ſcrophulous ſubſtance—ejaculatory ducts obliterated—one wanting—ſcirrhus—cancer, —morbid enlargement of the cells.

THE ORGANS OF GENERATION IN WOMEN.

The parts which ſerve for generation in women are divided into external and internal.

The EXTERNAL PARTS are—

1. The *mons Veneris*. The prominent portion of integuments immediately over the oſſa pubis. It is formed by a quantity of fat under the ſkin; and, after puberty, is covered with a ſhort hair.

2. The *labia majora*. Theſe are the two external lips, of a ſoft conſiſtence, and formed of very vaſcular common integuments. They begin from the ſymphyſis of the pubis, are covered externally with hair, but their internal ſurface is ſmooth, and lubricated with the ſmegma of the odoriferous glands.

3. The *clitoris*. A ſmall ſubſtance, placed juſt below the origin of, and within the labia majora. It reſembles a penis in miniature, and, like it, is formed of two ſpongy ſubſtances, which ariſe by two crura from the aſcending ramus of the iſchium. The clitoris is alſo, like the natural penis, covered with a foreſkin. During coition, it is the principal ſeat of pleaſure, and is diſtended and erected by the venereal ſtimulus.

4. The *nymphæ*, or *labia minora*. Theſe are the two inner folds, placed at the commencement of the vagina; they begin from the foreſkin of the clitoris, enlarging as they paſs downwards, and terminate in the under part of the beginning of the vagina. Their ſtructure is highly vaſcular and ſenſible, and they have a number of ſebaceous glands to lubricate them. Their uſe appears to be, to aſſiſt in creating the venereal pleaſure, and to direct the urine flowing againſt them out of the urethra, in ſuch a manner as to prevent it wetting the thighs.

5. The *meatus urinarius*. Which is a ſmall triangular opening, ſituated immediately under the clitoris, behind the nymphæ, and beſet with mucous glands.

6. The *hymen*. This is ſeldom met with but in children, in whom it is moſtly a ſemilunar membrane, ſituated at the entrance of the vagina, behind the meatus urinarius. When once lacerated, it forms ſeveral fleſhy excreſcences, which are called *carunculæ myrtiformes*.

Diseased appearances. The *labia majora* are ſubject to inflammation—abſceſs—gangrene—adheſion with each other—warts—necroſis, or dry gangrene. The *clitoris*, to enlargement—and its prepuce, to excreſcences. The *nymphæ* are often found elongated—ſcirrhous—carcinomatous. The *meatus urinarius* is frequently found inflamed—fimbriated—ulcerated. The *hymen*, imperforated.

Operations. Separating the labia majora—extirpating the enlarged clitoris, or nymphæ—perforating the hymen—the mode of introducing the catheter.

The internal parts of generation are the vagina, uterus, Fallopian tubes, ovaria, broad and round ligaments of the uterus, and the urethra.

VAGINA.

An elaſtic membranous canal, leading from the nymphæ upwards, under the arch of the pubis, between the bladder and rectum; and terminating at the neck of the uterus, which it embraces.

Substance. It is compoſed of three membranes:

1. An epidermis, which enters from without.

2. A white, thick, elaſtic membrane, which, in the virgin vagina, forms an immenſe number of tranſverſe rugæ, or folds.

3. A cellular coat, which is external, and connects it to neighbouring parts.

Beſides theſe coats, the vagina has alſo, eſpecially at its anterior part, a number of muſcular fibres, which ſurround it like a ſphincter. In the vagina the following are to be noticed:

1. A number of *lacunæ*, which excrete the mucus of the vagina.

2. In virgins, the ***hymen***, and, where this has been once ruptured, the *carunculæ myrtiformes*, or remains of the hymen.

3. The *meatus urinarius*, immediately under the ſymphyſis pubis, behind the clitoris.

4. The vaginal portion of the uterus, or *os uteri*.

Vessels. The arteries of the vagina are very numerous; they ariſe from the pudical, forming a net-work around the vagina. The blood is returned into the hæmorrhoidal vein.

> When women *menſtruate during pregnancy*, the catamenia are furniſhed by the veſſels about the ſuperior part of the vagina.

The absorbents of the vagina are alſo very numerous; they tend towards the iliac glands, into which they convey their contents.

Use. The vagina embraces the penis in coition, and, by its muſcular fibres at its origin, and its elaſtic membranous ſubſtance, accommodates itſelf to the ſize of that organ. The catamenia paſs from the uterus through the vagina; as does alſo the fœtus, in labour.

Diseased appearances. Inflammation, or *elcutritis*—abſceſs—gangrene—adheſions of its ſides—common ulceration, ſcrophulous and cancerous—ſcirrhous tumours—morbid narrowneſs—very ſhort—leucorrhœa—gonorrhœa—*elytrocele*—*prolapſus*—morbid widening from peſſaries, polypus, &c.

Operations. Application of peſſaries—puncturing the urinary bladder through the vagina—dividing morbid adheſions—

removing enlarged carunculæ myrtiformes — perforating the hymen — removal of polypi.

UTERUS.

The uterus, or womb, is a ſpongy hollow receptacle, ſomewhat like a flattened pear, ſituated in the pelvis, between the urinary bladder and rectum.

Anatomiſts divide the uterus into the vaginal portion, the neck, the body, the fundus, and its appendages.

The *vaginal portion* is called the *os uteri*, and, from its reſemblance to the mouth of a tench fiſh, *os tincæ*; midwives uſually termed it *os internum*, giving the name of *os externum* to the orifice of the vagina. In virgins it is much leſs than in thoſe who have borne children: it conſiſts of two labia, and an opening between, which leads to the cavity of the uterus. In the internal ſurface of the os uteri are ſituated a number of folds, and occaſionally ſeveral ſmall veſicles, and a quantity of tranſparent gelatinous mucus.

The *neck of the uterus* is alſo hollow, and contains ſeveral plicæ, or folds. In ſome uteri it is longer than in others; its cavity leads to that of

The *body* of the uterus. Children and virgins have the uterus more flattened than others; it is ſomewhat of a triangular ſhape, having its appendages going from each ſuperior angle, whilſt the body gradually diminiſhes towards the os uteri. The cavity in the body of the uterus is alſo of a triangular ſhape: it commences at the os uteri, is nearly of the ſame diameter all along the neck of the uterus, and enlarges in the body. At each ſuperior angle, the cavity of the uterus receives that of the Fallopian tube. The uterus is lined by a ſmooth vaſcular membrane, whoſe veſſels ſecrete the menſtrual blood.

Structure. The portion of the uterus which hangs into the cavity of the pelvis is covered by peritoneum, whilſt the vaginal portion receives a tunic from the epidermis, continued from the vagina. The body of the uterus is compoſed of *peculiar* fibres, blood-veſſels, abſorbents, and nerves. Theſe fibres do not appear, in an unimpregnated uterus, to be of the ſame nature as thoſe of the impregnated uterus.

Vessels. The *arteries* of the uterus are the ſpermatic and uterine, which are branches of the internal iliac. The *veins* accompanying the arteries return the blood into the external hæmorrhoidal, internal iliac, and ſpermatic veins. The *nerves* of the uterus are branches of the ſacral and great ſciatic nerve; it alſo has branches from the meſocolic plexus. The *abſorbents* are rarely ſeen: yet they are numerous, and proceed to the iliac glands.

Appendages of the uterus. Under this term are comprehended the round and broad ligaments, the Fallopian tubes, and the ovaries.

1. *Round ligaments.* Theſe are two vaſcular ligaments, about the ſize of a gooſe-quill, which ariſe one from each ſide of the uterus, near its fundus, and ſomewhat on its anterior ſurface, and proceed obliquely outwards and downwards to the ring of the external oblique muſcle, which they paſs through, and are loſt in the fat about the labia majora.

> Relaxation of theſe ligaments allows the uterus to deſcend into the vagina; and in many inſtances this relaxation is ſo great as to ſuffer the uterus to be wholly without the os externum.

2. The *Fallopian tubes.* Theſe are alſo termed uterine tubes: they go one from each ſuperior angle of the uterus directly acroſs the pelvis, for the ſpace of four inches, covered by the peritoneum, and terminate by a fringed body, the *fimbriæ*,

which float in the cavity of the pelvis. The ſubſtance of the Fallopian tube is of a muſcular nature, by which means it has a periſtaltic motion. In the middle of the fimbriæ is the opening of the tube; ſo that if air were blown into the cavity of the vagina, it would paſs into the cavity of the uterus, then along the Fallopian tubes into the cavity of the abdomen.

3. The *broad ligaments*, which conſiſt of a duplicature of the peritoneum paſſing over the tubes and ovarium, and going in form of a broad expanſion to the ſides of the pelvis; ſo that the peritoneum of the upper and under ſurfaces of the uterus meeting at the ſides, goes acroſs the pelvis to its ſide, forming what is called the broad ligaments: in this paſſage it envelopes the tubes, ovaria, and blood-veſſels.

4. The *ovaria*. Two oblong and rather flattened bodies, hanging in the duplicature of the peritoneum, at the ſides of the uterus, about two inches from it, and behind the broad ligaments. Under the peritoneal coat of the ovarium is its proper ſubſtance, which is ſubcartilaginous. An adult virgin ovarium contains a number of highly vaſcular veſicles, filled with a tranſparent fluid; theſe are *ovula*, and were firſt accurately deſcribed by De Graaf. Beſides theſe veſicles, there are occaſionally two or more blackiſh ſpots; theſe are called *corpora lutea*; they were ſuppoſed to be a certain criterion of the woman's having borne a child; but this is erroneous, for corpora lutea exiſt in virgins.

USE. The uterus and its appendages are for the purpoſes of generation, and the perfection of the young.

DISEASED APPEARANCES OF THE UTERUS. Inflammation, called *metritis*—ſcirrhus—cancer—gangrene—tubercles—morbidly diſtended, with coagulated lymph of a laminated ſtructure—with a fluid, called *hydrops uteri*—polypus—inverſion—

retroverſion—ſtricture of the cavity—converted into bony and earthy matter—a maſs of bone in the cavity of the uterus—calculi of the uterus—aſcarides in the uterus—hydatids—ruptures of the uterus—two uteri—no uterus.

Ovaria. Inflammation of the peritoneal coat, called *peritonitis ovarii*—of the ſubſtance of the ovarium—of its veſicles, or *ovula*—ſcirrhus—abſceſs—gangrene—the tunic of the veſicles converted into a black membrane—coagulated blood in the veſicles—an increaſe of fluid in the veſicles, called *hydrops ovarii*—the ovaria converted into a fatty ſubſtance, with hair and teeth—a fœtus in the ovarium—a morbid ſhrinking of the ovaria—an ovarium wanting—corpora lutea in virgins.

Fallopian tubes. Inflammation of the tube and its fimbriæ—adheſions to neighbouring parts—hydatids adhering—dropſy—ending in a *cul de ſac*, the fimbriæ being wanting—a fœtus in the Fallopian tube—ſcirrhous tumours growing to the tube—a tube wanting.

PHYSIOLOGY OF MENSTRUATION.

By a law of nature, women menſtruate in this climate from about the age of fifteen to forty-five. Menſtruation is the efflux of ſanguineous fluid from veſſels opening into the cavity of the uterus. During pregnancy, the *catamenia*, or *menſes*, for ſo the diſcharge is called, ſtop, except in ſome few inſtances, where it is ſupplied by the veſſels of the vagina.

The nature of menſtrual blood, if women be healthy, differs only from other blood in its not coagulating, which may be cauſed by its ſlow exit, and its mixture with the ſecretions of the uterus and vagina. It differs, however, in quantity, the period of its firſt appearance, its duration, and the ſymptoms which precede and accompany it, according to the age, temperament, habit of body, climate, ſeaſon of the year, mode of living, and other circumſtances.

Women are ſaid to be moſt ſuſceptible of the action of the vivifying principle of the *ſemen virile* during the period of menſtruation.

PHYSIOLOGY OF CONCEPTION.

The congreſs between man and woman is called coition, which is ſo well known as to require no deſcription.

During coition the nymphæ and clitoris are tumid with blood, and the fimbriæ of the Fallopian tubes, by a power inherent in them, are ſtretched out, and applied over the ſurface of an ovum in the ovarium.

The pleaſure which women experience during coition is very great, and a quantity of mucus is ſuddenly emitted from the glands of the vagina, during the venereal orgaſm, which, in former times, was erroneouſly ſuppoſed to be the ſemen of the female; but now it is the opinion of phyſiologiſts that women have no ſemen, as anatomy cannot detect any organ deſtined to ſecrete it.

In order that a woman *may conceive*, it is requiſite—

1. That ſhe ſhall have *menſtruated*.
2. That the ovum in the ovarium ſhall have arrived at a ſtate of *maturity*.
3. That the fimbriæ of the Fallopian tube ſhall be *ſtretched over* the mature ovum, ſo as to let the cavity of the Fallopian tube come immediately over it.

Under theſe circumſtances, if the male ſemen be emitted into the uterus, its vivifying part, which is extremely ſubtile, and called the *aura ſeminis*, flies through the cavity of the uterus along the Fallopian tube to the mature ovum, and imparts to it a principle by which it begins to circulate its fluids, and is animated. The ovum, thus vivified, enlarges and ruptures the ſlender tunic of the ovarium, in which it was encloſed. At the time of its rupturing, the fimbriæ of the Fallopian tube embrace it, and it is rolled, by the periſtaltic motion of the latter, into the cavity of the uterus, there to be perfected, and at the expiration of nine months to be ſent into the world.

OF THE GRAVID UTERUS.

The parts of the gravid uterus are, the uterine placenta, the umbilical cord, the membranous ovum of the fœtus, the liquor amnii, and the fœtus.

UTERINE PLACENTA.

A ſpongy maſs, like a cake, generally adhering to the fundus of the gravid uterus, compoſed of a net-work of very numerous veſſels.

SUBSTANCE. Cellular, like a ſponge, and filled with veſſels. **ABSORBENTS** have been lately diſcovered.

USE. To receive and prepare the blood from the uterus for the fœtus, and give off veſſels to the umbilical cord.

FUNICULUS UMBILICALIS, OR UMBILICAL CORD.

A cord of an inteſtinal form, moſtly about half a yard in length, which runs from the navel of the fœtus to the centre of the placenta.

It is **COMPOSED** of a cutaneous vagina, or ſheath, a cellular ſubſtance, filled with a peculiar gelatinous fluid, one umbilical vein, and two umbilical arteries.

Uſe. The umbilical vein of the fœtus conveys the blood from the placenta to the fœtus, and the two umbilical arteries return it from the fœtus to the placenta.

MEMBRANOUS OVUM OF THE FŒTUS.

The fœtus is encloſed in a membranous ovum, or bag, within the cavity of the uterus.

The *ovum* conſiſts of three membranes: an outer, or filamentous, called *decidua*; a middle one, which in the embryo is ſhaggy, called the *chorion*; and an inner one, termed the *amnion*.

Uſe. To include the liquor amnii, to prevent its flowing into the uterus, and, at the commencement of parturition, to aſſiſt in dilating the os uteri.

LIQUOR AMNII, OR LIQUOR OF THE AMNION.

A lymphatic liquid, encloſed in the cavity of the ovum ſurrounding the fœtus, ſecreted by the exhaling arteries of the membranes of the ovum.

Quantity. About the time of parturition, two or three pounds.

Property. Gelatinous, like turbid ſerum of milk.

Uſe. To defend the fœtus from the preſſure of the uterus, to give it nouriſhment, to dilate the orifice of the uterus in labour, and to lubricate the vagina.

FŒTUS.

During the firſt month of pregnancy, the ovum is about the ſize of a pigeon's egg; the fœtus ſwims in the middle of the liquor amnii, and repreſents a little cloud, which gradually enlarges.

enlarges, and its parts become more firm and perfect. The parts of the fœtus at birth differ from the adult, in having a *foramen ovale*, a *canalis arterioſus*, a *canalis venoſus*, an umbilical cord, and the *thymus gland*. The lungs are black, collapſed, and ſink in water. The liver is large. All the ſmall glands are alſo proportionately large, and the large inteſtines are filled with meconium.

Peculiarities. Theſe are—1. An *umbilical vein*, which goes to the liver.—2. Two *umbilical arteries*, which ariſe from the internal iliac.—3. A *canalis venoſus*, or vein, which proceeds from the ſinus of the vena portæ into the vena cava inferior.—4. An opening in the ſeptum of the auricles, called the *foramen ovale*. — 5. A *canalis arterioſus*, or artery, which ariſes from the pulmonary artery, and paſſes obliquely into the aorta.—6. The *thymus gland*, ſituated in the anterior ſpace of the mediaſtinum. After birth theſe veſſels gradually become impervious, and at length are removed by the abſorbents.

CIRCULATION OF THE BLOOD IN THE FŒTUS.

The fœtus receives its blood from the mother through the umbilical vein of the funis, which tranſmits it along the ductus venoſus into the vena cava, to be carried to the right auricle of the heart. From the right auricle it paſſes partly through the foramen ovale into the left auricle, and partly into the right ventricle. From the right ventricle it is propelled into the pulmonary artery, which ſends a very ſmall proportion through the lungs, and the remainder through the canalis arterioſus into the aorta. The blood is returned from the fœtus by the two umbilical arteries, along the cord, to the mother.

HYGROLOGY;

OR,

DOCTRINE OF THE FLUIDS.

The fluids of the body are divided into *crude*, as the chyle; *ſanguineous*, as the blood; *lymphatic*, as the lymph of the lymphatic veſſels; *ſecreted*, or thoſe ſeparated from the blood; and *excrementitious*, as the urine, fæces, &c.

The ſecreted fluids are ſubdivided into *lacteal*, as the juice of the proſtate gland; *aqueous*, as the aqueous humour of the eye; *mucous*, as the mucus of the noſtrils; *albuminous*, as the ſerum of the blood; *oleous*, as the oil of the adipoſe membrane; and *bilious*, as the bile.

The fluids of the body are alſo divided, from their motion, into *circulatory*, which continually circulate in the veſſels; *commorant*, which circulate with a ſlow motion, as the ſemen, oil of the adipoſe membrane; *ſtagnant*, which remain for a certain time in any receptacle, as cyſtic bile, &c.

FLUIDS COMMON TO THE WHOLE BODY.

THE BLOOD.

A red fluid, which circulates in the cavities of the heart, arteries, and veins.

COLOUR. In the arteries, of a *florid* hue; in the veins, *darker*, except in the pulmonary veins.

Blood expoſed to the atmoſphere ſpontaneouſly *ſeparates* by degrees into two parts, viz. the *ſerum*, a yellow and ſomewhat greeniſh fluid; and a *cake*, called alſo the *cruor*, or *craſſamentum*, which reſembles a red maſs, ſwimming like an iſland in the ſerum.

USE. To ſtimulate the cavities of the heart and veſſels to contraction ; to generate the heat of the body, and propagate it to every part ; to nouriſh every part ; and to ſupply all the ſecretions, they being all ſeparated from the blood.

THE LYMPH OF THE LYMPHATIC VESSELS.

A taſteleſs cryſtalline liquid, contained in the lymphatic veſſels.

It is ABSORBED from the ſurface of the body, tela celluloſa, viſcera, and cavities of the viſcera of the whole body ; and CONVEYED into the thoracic duct.

USE. To return the ſuperfluous nutritious fluid, the vapours of cavities, and ſubſtances applied to the ſkin, to the thoracic duct.

THE VAPOUR OF THE SHEATHS OF THE NERVES.

The aqueous humour contained in the vaginæ, and between the fibrils, of the nerves.

It is ſecreted by the arteries of the ſheath of the nerves.

USE. To moiſten the nervous fibrils.

FLUIDS PROPER TO EACH PART.

IN THE CAVITY OF THE CRANIUM.

1. A *vapour*, between the membranes of the brain, which prevents morbid adheſions.

An increaſe of this fluid conſtitutes the *hydrops membranarum*, or *hydrocephalus externus*.

2. The *vapour in the ventricles of the brain.* A thin vapour contained in the cavity of the ventricles of the brain, and *ſecreted* by the exhaling arteries of their internal membrane, and

of the choroid plexus.—Its *uſe* is to prevent the concretion of the ventricles.

An accumulation of this fluid forms the *hydrocephalus internus.*

IN THE CAVITY OF THE NOSTRILS.

The *mucus of the noſtrils.* The mucus *ſecreted* by the muciparous glands of the pituitary membrane, lining the ſeptum and conchæ of the noſtrils.—Its *uſe* is to preſerve the nervous papillæ of the olfactory nerves moiſt, and to moderate exceſſive ſenſibility.

IN THE CAVITY OF THE MOUTH.

The *ſaliva.* A fluid ſecreted by the ſalivary glands into the mouth.—The *ſecretory organ* is compoſed of the parotid, ſubmaxillary, and ſublingual glands.—Its *uſe* is to augment the taſte of the food; to mix with, diſſolve, and reſolve the food into its principles; and to moderate thirſt.

IN THE CAVITY OF THE FAUCES.

The *mucus of the fauces.* A mucus ſecreted by the muciparous glands of the tonſils, pharynx, &c.—Its *uſe* is to lubricate the fauces.

IN THE EYES.

1. The *aqueous humour of the eye.* A very limpid water which fills the anterior and poſterior chambers of the eye.—It is *ſecreted* by the floating veſſels of the corpus ciliare, and exhaling veſſels of the iris.—Its *uſe* is to diſtend the cornea, retain the cryſtalline lens and vitreous humour in their places, and to tranſmit the focus of the rays of light to the cryſtalline lens.

2. The *cryſtalline lens.* A lentiform, pellucid, cellular body, diſtended by a very limpid aqueous fluid, encloſed in a membranous capſule, and ſituated in a depreſſion in the anterior ſurface of the vitreous humour.—Its *uſe* is to tranſmit and refract the focus of the rays of light to the vitreous humour.

3. The *vitreous humour.* A pellucid vitriform or glaſs-like body, which fills the whole bulb of the eye behind the cryſtalline lens.—It is *compoſed* of ſmall cells, diſtended with a limpid water. —Its *uſe* is to expand the bulb, and tranſmit and moderately augment the focus of the rays of light from the cryſtalline lens to the retina.

4. The *water in the capſule of the cryſtalline lens.* It is *ſecreted* by the pellucid branches of the artery of the cryſtalline lens. —Its *uſe* is to prevent the concretion of the cryſtalline lens with its capſule.

5. The *pigment of the iris.* The coloured mucus, which covers the anterior and poſterior ſurface of the iris.—Its *uſe* is to reflect the rays of light.

6. The *pigment of the choroid membrane.* The black or browniſh mucus, which covers the anterior ſurface of the choroid membrane, and the interior of the corpus ciliare.

7. The *tears.* A limpid fluid ſecreted by the lachrymal gland, and flowing on the ſurface of the eye.—Its *uſe* is to moiſten the ſurface of the eye and eyelids.

8. The *juice of Meibomius's glands.* An unctuous humour ſecreted by the ſebaceous glands of Meibomius, and lubricating the tarſi of the eyelids.—Its *uſe* is to lubricate the tarſi of the eyelids, and involve the ſaline acridity of the tears.

IN THE CAVITY OF THE EARS.

1. The *cerumen,* or *wax of the ears.* A bitter ceraceous fluid ſecreted by the ceruminous glands of the meatus auditorius

externus.—Its *uſe* is to lubricate the ſenſible membrane of that canal, and to prevent inſects from entering.

2. The *water of the labyrinth.* An inſipid water contained in the cavity of the membranous ſemicircular canals and cochlea.—Its *uſe* is to preſerve the nervous fibrils of the auditory nerve ſoft and moiſt, and to moderate the tremors of ſounds.

IN THE NECK.

1. The *juice of the thyroid gland.* It is of a yellowiſh white colour, eſpecially in infants, and its *uſe* is not known.

2. The *mucus of the œſophagus:* which is ſecreted by the muciparous glands, ſituated in the cellular membrane.—Its *uſe* is to lubricate the cavity of the œſophagus, and prevent the concretion of its ſides.

IN THE CAVITY OF THE THORAX.

1. The *mucus of the trachea, bronchia, and veſiculæ pulmonales.* This fluid is ſecreted by the muciparous glands ſituated under the internal membrane of thoſe parts.—Its *uſe* is to prevent the ſurface of the trachea, bronchia, and veſiculæ pulmonales from becoming dry by the continual paſſing of the air.

2. The *vapour in the cavity of the thorax;* which exhales from the exhaling veſſels of the pleura of the lungs and ribs, into the cavity of the thorax.—It preſerves the pleura ſoft, moiſt, and flexile; and defends and prevents it from the friction of, and concretion with, the lungs.

Hydrothorax is an accumulation of this fluid, or of a diſeaſed ſecretion.

3. The *vapour or liquor pericardii.* Secreted by the arterious exhaling veſſels, which open upon the external ſurface of the

heart, and internal of the pericardium.—Its *uſe* is to prevent the concretion of the heart with the pericardium, to diminiſh the friction, and preſerve the parts ſoft.

When this fluid, or a diſeaſed one, accumulates in the pericardium, it forms the *hydro-cordis*, or *hydrops pericardii.*

4. The *juice of the thymus gland.* A milky juice ſecreted by the arteries of this gland; its uſe is not known.

IN THE BREASTS.

The *milk of the breaſts.* A white, ſweetiſh fluid, ſecreted by the glandular fabric of the breaſts of women.—Its *uſe* is to be an aliment to new-born children.

IN THE ABDOMEN.

1. The *gaſtric juice.* A limpid colourleſs fluid, ſecreted by the exhaling veſſels of the very numerous arteries, which bedew every part of the ſtomach.—Its *uſe* is to digeſt the food.

2. The *pancreatic juice:* which is limpid, and ſecreted by this gland, and conveyed through its excretory duct, into the duodenum.—Its *uſe* is to aſſiſt in the formation of chyle.

3. *Bile.* A yellowiſh green, bitter juice, ſecreted by the glandular ſubſtance of the liver, and conveyed by the biliary ducts, in part, into the duodenum, and in part into the gall-bladder: hence cyſtic and hepatic bile.—Its *uſe* is to extricate the chyle from the digeſted maſs of food, to ſtimulate the inteſtines, and to prevent the abundance of mucus and acidity in the primæ viæ.

4. *Chyle.* A white fluid, ſeparated from the food in the primæ viæ, and obſerved ſome hours after eating in the lacteal veſſels of the meſentery, and in the thoracic duct.—Its *uſe* is to form the blood.

5. The *enteric juice.* A limpid liquor, ſecreted by the exhaling arteries in the whole courſe of the ſmall and large inteſtines.—Its *uſe* is to aſſiſt in digeſtion, and to cleanſe and moiſten the inteſtines.

6. The *mucus of the primæ viæ.* This is ſecreted by the muciparous glands ſituated under the villous coat of the primæ viæ.—Its *uſe* is to lubricate the ſtomach and inteſtinal canal.

7. The *vapour of the cavity of the abdomen.* An aqueous vapour, ſecerned by the exhaling arteries of the peritoneum, which preſerves moiſt, and prevents the concretion of the abdominal viſcera.

A collection of this fluid conſtitutes the *aſcites abdominalis*, or dropſy of the belly.

8. *Urine.* A ſaline liquid, of a citrine colour, ſecreted in the kidnies, and dropping down from them guttatim through the ureters into the cavity of the urinary bladder.—Its *uſe* is to liberate the body from the ſuperfluous water, &c.

9. The *mucus of the bladder.* Secreted by the muciparous glands ſituated under the innermoſt membrane.—Its *uſe* is to lubricate and defend the internal and very ſenſible ſurface of the urinary bladder.

IN THE PARTS OF GENERATION IN MEN.

1. The *mucus of the urethra.* Secreted by the muciparous glands ſituated under the internal membrane.—Its *uſe* is to lubricate and defend the very ſenſible ſurface of the urethra againſt the acridity of the urine.

2. The *ſmegma of the glans penis.* An unctuous humour, ſecreted by the ſebaceous follicles on the ſurface of the glans and prepuce.—Its *uſe* is to lubricate the ſenſible ſurface of the glans, and prevent its concretion with the prepuce.

3. The *vapour of the tunica vaginalis teſtis:* which exhales from the arteries into the cavity of the tunica vaginalis teſtis. —Its *uſe* is to prevent the concretion of the teſtes with the tunica vaginalis, and preſerve them moiſt.

Hydrocele is an accumulation of this fluid.

4. The *liquor of the proſtate gland.* A milky juice, ſeparated by the arteries of the proſtate gland, and ſent through its ducts, *ſub coitu*, into the urethra with the ſemen.—Its *uſe* is to ſerve as a vehicle to the ſemen.

5. The *ſemen.* A prolific liquor ſecreted in the teſtes, and carried through the epididymis and vas deferens into the veſiculæ ſeminales.—Its *uſe* is to be emitted, *ſub coitu*, into the female vagina, and there, by its aura, to penetrate to, and impregnate the ovulum in the female ovarium.

IN THE PARTS OF GENERATION IN WOMEN.

1. The *ſmegma of the labia and vulva.* An unctuous juice, ſecreted by the ſebaceous glands, and covering the internal ſurface of the labia and nymphæ.—Its *uſe* is to lubricate their ſenſible ſurface, and prevent any irritation *poſt mictum.*

2. The *mucus of the vagina:* which is ſecreted by the muciparous glands under the internal membrane.—Its *uſe* is to lubricate the vagina, leſt it be irritated by friction, *ſub coitu*, and to prevent the concretion of its ſides.

3. The *liquor of the cavity of the uterus.* Secreted into it by the exhaling arterious veſſels. In the virgin uterus, it is ſerous and turbid; in the gravid, milky.—Its *uſe* is to moiſten the cavity, and prevent its concretion.

IN THE ARTICULATIONS.

1. The *ſynovia.* An unctuous fluid, ſecreted by the internal membrane of the capſular ligaments ſurrounding the articula-

tions of the bones.—Its *uſe* is to lubricate the cartilaginous ſurfaces of the articulatory bones, and facilitate their motions.

2. The *juice of the burſæ mucoſæ*. An unctuous and ſomewhat mucilaginous juice, ſecreted by the veſſels of the internal membrane of the burſæ mucoſæ.—Its *uſe* is to lubricate the tendons for motion.

IN THE BONES.

The *marrow of bones*. An oily ſubſtance ſecreted by the arteries of a very vaſcular membrane lining the interſtices of the bony *lamellæ*, and the cavities of bones. In the fœtus, the marrow is not oil, but a ſoft florid fluid.

> Inflammation of the membrane which ſecretes the marrow is ſometimes the cauſe of *ſpina ventoſa*.

FLUIDS OF THE COMMON INTEGUMENTS.

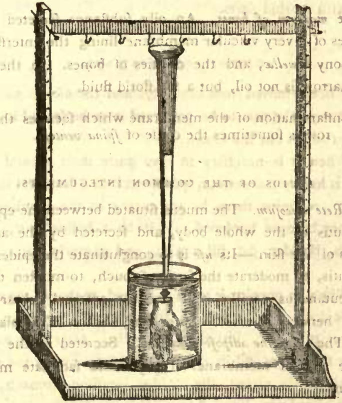
1. *Rete mucoſum*. The mucus ſituated between the epidermis and cutis of the whole body, and ſecreted by the arterious veſſels of the ſkin.—Its *uſe* is to conglutinate the epidermis to the cutis, to moderate the ſenſe of touch, to moiſten the nervous cutaneous papillæ, and give the external colour to the body; hence it is *white* in Europeans, *black* in Æthiopians, &c.

2. The *oil of the adipoſe membrane*. Secreted by the arteries of the cellular membrane.—Its *uſe* is to facilitate muſcular motion.

3. *Sweat*. The aqueous perſpirable matter excreted through the exhaling arteries of the ſkin.—Its *uſe* is to keep the ſkin moiſt.

> A morbid increaſe of perſpiration is termed *ephidroſis*, or *ſudor Anglicanus*.

THE
RUYSCHIAN ART,
and
Method of making PREPARATIONS to exhibit the STRUCTURE
of the
HUMAN BODY.



THE QUICKSILVER TRAY, AND ITS APPENDAGES.

The tray is to be made of mahogany, of a convenient ſize, and to have a ſmall hole in one corner, with an ivory plug, to let out the mercury, when neceſſary. The two uprights are moveable, and cut ſo as to permit the croſs bar to be fixed at any diſtance from the tray. The uprights and croſs bar are only to be affixed occaſionally, as when a hand or teſtis is to be filled with mercury.

PREPARATIONS OF THE VISCERA.

THE various parts of the body may be preſerved in a healthy ſtate, either to exhibit their form or ſtructure, or to compare them with morbid parts.

GENERAL OBSERVATIONS.

1. When removed from the body, and the uſeleſs parts diſſected away, the part to be preſerved is to be ſoaked in water, in order to get out the blood.

2. When it is neceſſary to give parts their natural form, which is loſt by macerating, put them into a ſaturated ſolution of alum, retaining them by any means in the required form until they become hardened. If it be a hollow part, as the ſtomach, bladder, &c. fill it with, and immerſe it in, the ſolution.

3. When an opening is to be exhibited, as that of the ureter, the bile-duct, the lacunæ of the urethra, Stenonian duct, Fallopian tube, &c. introduce a briſtle. After this manner preſerve the uterus and its appendages, cutting open the vagina and cavity of the uterus, the bladder, inteſtine, ſtomach, heart in the pericardium, liver, ſpleen, kidney, &c. &c.

4. All preparations of the brain are beſt hardened in a ſaturated ſolution of corroſive ſublimate.

5. The parts are to be ſuſpended in proof ſpirit by raw ſilk, in a tie-over bottle, and covered with bladder, taking care to exclude all air. When dry, varniſh the bladder with mucilage of gum arabic ſeveral times; then put a ſheet of thin lead

over, and varniſh its edges with mucilage; and, laſtly, tie another bladder over, and give it a coat of common ſpirit varniſh, in which lamp-black, or other colouring matter, is mixed.

PREPARATIONS OF MORBID PARTS.

All morbid parts ſhou'd, immediately after their removal from the body, be put into rectified ſpirit of wine for a day or two, and then preſerved in proof ſpirit. Theſe preparations foul a great quantity of ſpirit, and ſhould therefore be kept in ſtopper-glaſſes, from which the ſpirit can eaſily be removed, and freſh put in, until the preparation ceaſes to foul the ſpirit, when it may be put into a tie-over bottle.

PREPARATIONS MADE BY MACERATING.

Preparations obtained by this proceſs are very various.

GENERAL OBSERVATIONS.

1. Let the water be frequently changed, until it is no longer coloured with blood, but never after the blood is ſteeped away.

2. Let the macerating pan be placed in a warm place, to facilitate putrefaction.

3. The macerating pan ſhould never be in a cold place, for the ſpermaceti-like converſion of the ſoft parts will be formed, and the bones ſpoiled.

4. The ſoft parts ſurrounding bones are a long time before they detach themſelves from the bones.

5. Bones, when macerated, ſhould be expoſed to the ſun's rays, and frequently wetted with clean water, or they may be bleached with the diluted oxygenated muriatic acid.

BONES.

Bones are macerated to be preſerved whole, or they are ſawed to expoſe their internal ſtructure.

Bones of the head. Put the whole head, without diſturbing the fleſh or brains, into the pan. When ſufficiently macerated, all the ſoft parts will come away with the perioſteum; then detach the vertebræ, and waſh out the brain. Bones are ſeparated from each other by filling the cranium with peas, and putting it into water. The ſame method is to be adopted with other bones.

Bones in general, for ſtructure. Divide the femur into two halves; the os innominatum, the petrous portion of the temporal bone, the parietal bones, &c.: theſe, when macerated, will exhibit the compact, the ſpongy, laminated, and reticular ſubſtance of bones.

A FŒTUS

Cut carefully away the fatty ſubſtance enveloping a fœtus, but do not cut any of the cartilages. Steep out its blood, and macerate. It ſhould be frequently looked at, and taken out when the fleſh is all deſtroyed, before the cartilages are ſeparated. The following preparations are obtained in this way:

1. The ſuperior extremity, to ſhow its bones, the progreſs of oſſification, and the cartilage to be formed into bone.
2. The lower extremity, to expoſe the ſame circumſtance.
3. The ſpine, which forms a beautiful preparation.
4. The pelvis, not leſs elegant.

Preſervation. The above all to be preſerved in proof ſpirit.

CUTICLE.

The cuticle of the hand and foot may be ſeparated by maceration: the former is called *chirotheca*, the latter *podatheca*. The arm and foot of a large fœtus are to be preferred; they are firſt to be well waſhed with a ſoft ſponge in ſoap and water.

Preſervation. Suſpend them in proof ſpirit: firſt tie the part by which they are to be ſuſpended, then put them into the bottle with the ſpirit, and gently pour ſome ſpirit into the cuticle, to diſtend it like a glove or ſtocking.

INJECTING INSTRUMENTS.

The celebrated Dutch anatomiſt, *Ruyſch*, firſt invented the art of injecting animal bodies.

There are three kinds of apparatus uſed in making injected preparations. The one for the coarſe and fine injections, and the minute injection; the other for injecting with quickſilver; and the third, called the oyſter ſyringe, for injecting minute preparations with the minute injection only.

The firſt conſiſts of a braſs ſyringe made for the purpoſe, of various ſizes, from one carrying ſix ounces to one ſufficiently large to hold two pounds. The point of theſe ſyringes is adapted to the pipes into which it is to be affixed. To this ſyringe belong a ſtop-cock, and a great variety of pipes.

The inſtrument for injecting quickſilver conſiſts of a long glaſs tube, at whoſe end is fixed, by ſcrewing in, a ſteel pipe, the end of which is extremely fine.

The oyſter ſyringe is ſimilar to the large ſyringe, except in ſize. It is ſo ſmall, that when the ſyringe is in the hand, and full, its piſton may be commanded by the thumb of that hand to throw its contents into any preparation in the other hand. The pipe affixed by being ſcrewed to the end of this ſyringe is nearly as ſmall as that belonging to the quickſilver tube.

Theſe inſtruments are always to be had at the ſurgical inſtrument makers.

INJECTIONS.

The injections employed for anatomical purpoſes are of four different kinds: coarſe, fine, minute, and mercurial.

COARSE INJECTIONS.

Red. Yellow bees' wax, ſixteen ounces—the paleſt reſin, eight ounces—turpentine varniſh, ſix ounces, by meaſure—finely levigated vermilion, three ounces.

Yellow. Yellow bees' wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—king's yellow, two ounces and a half.

White. Fine virgins' wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—beſt flake white, five ounces and a half.

Pale blue. Fine virgin's wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—beſt flake white, three ounces and a half—fine blue ſmalt, three ounces and a half.

Dark blue. Fine virgins' wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—blue verditer, ten ounces and a half.

Black. Yellow bees' wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—pure lamp black, one ounce.

Green. Yellow bees' wax, ſixteen ounces—pale reſin, eight ounces—turpentine varniſh, ſix ounces—levigated cryſtallized verdigriſe, four ounces and a half—beſt flake white, one ounce—levigated gamboge, one ounce.

Liquefy the wax, reſin, and turpentine varniſh over a ſlow fire, in an earthen pipkin; then add the colouring matter, having previouſly mixed it in another pipkin, with a very ſmall quantity of the melted compoſition. Stir the whole well together with a wooden peſtle, ſo that the colouring ingredients may be intimately and ſmoothly blended; place the whole again over the fire, and, when they have acquired their due heat, the injection will be fit for uſe.

FINE INJECTIONS.

Brown ſpirit varniſh, white ſpirit varniſh, of each four ounces—turpentine varniſh, one ounce.

Theſe are to be put together in an earthen pipkin, over a ſlow fire, until they have acquired the neceſſary degree of heat. To make it of a red colour, put one ounce of finely levigated vermilion into another pipkin, and gradually add the heated materials, ſtirring the whole with a wooden peſtle, that the colour may be equally diffuſed.

One ounce and a quarter of king's yellow—two ounces of beſt flake white—one ounce and a half of fine blue ſmalt, with one ounce and a quarter of beſt flake white—four ounces of blue verditer—half an ounce of pure lamp-black—are the proportions for the various colours to the quantity of ingredients ordered above.

MINUTE INJECTIONS.

The ſize, which forms the vehicle to the colouring matter in theſe injections, is made in the following manner:

Take, of the fineſt and moſt tranſparent glue, one pound, break it into ſmall pieces, put it into an earthen pot, and pour on it three pints of cold water; let it ſtand twenty-four hours, ſtirring it now and then with a ſtick; then ſet it over a ſlow fire for half an hour, or until all the pieces are perfectly diſſolved; ſkim off the froth from the ſurface, and ſtrain it through a flannel for uſe.

Iſinglaſs and the cuttings of parchment make an elegant ſize for very particular injections; and thoſe who are not very nice may uſe the beſt double ſize of the ſhops.

Red. Size, one pint—Chineſe vermilion, two ounces.

Yellow. Size, one pint—king's yellow, two ounces and a half.

White. Size, one pint—beſt flake white, three ounces and a half.

Blue. Size, one pint—fine blue ſmalt, ſix ounces.

Green. Size, one pint—levigated cryſtallized verdigriſe, two ounces—beſt flake white, levigated gamboge, of each eight ſcruples.

Black. Size, one pint—lamp-black, one ounce.

GENERAL OBSERVATIONS.

1. All injections are to be heated to ſuch a degree as not to deſtroy the texture of the veſſels they are intended to fill; the beſt criterion of this degree of heat is dipping the finger into the injection. If the finger can bear the heat, the texture of the veſſels will not be hurt.

2. All the coloured materials ſhould be as finely levigated as poſſible, before they are mixed with the injection.

3. Great care ſhould be taken leſt the oily ones boil over, or bubble; and that the heat be gentle, otherwiſe the colour will be altered.

4. They ſhould be conſtantly ſtirred, leſt the colouring material, which is much heavier than the vehicle, fall to the bottom.

5. The inſtrument to ſtir them with ſhould be a wooden peſtle, and there ſhould be one for each colour.

6. A large tin pan to contain water, with two or three leſſer ones fixed in it for the injections, will be found very uſeful, and prevent all accidents, and the colour from ſpoiling, when on the fire.

PREPARATIONS MADE WITH COARSE INJECTION.

The blood-veſſels are moſtly filled with coarſe injection, and the parts diſſected, to ſhow their courſe; and when the anatomiſt wiſhes to exhibit the minuter branches, the fine injection is to be thrown in firſt, and followed by the coarſe.

GENERAL OBSERVATIONS.

There are ſeveral circumſtances to be obſerved in injecting with the fine and coarſe injections, which are applicable to every part into which they are thrown; theſe are—

1. The part to be injected ſhould be freed from its blood as much as poſſible, by ſteeping it for ſeveral hours in warm water, and repeatedly changing it.

2. Having emptied the part of its blood, the pipes are to be fixed in their proper veſſels, and all other veſſels to be tied with a ligature.

3. The heat of the water is then to be gradually increaſed to the ſame temperature with the injection to be thrown in.

4. The injecting ſyringe ſhould be ſteeped in the water with the part to be injected, until wanted.

5. The injection being finiſhed, and the ſubject cold, remove the pipes, and tie up the parts they were in. Whenever a veſſel is open, by accident or otherwiſe, be ſure to ſecure it by a ligature, or cover it with a piece of thin and moiſt bladder, or the injection will always be oozing out.

6. The parts diſſected and dried are to be varniſhed twice with copal or hard varniſh, firſt waſhing them free from greaſe with ſome ſoap lees, and well drying them again.

BLOOD-VESSEL SUBJECT.

Select an emaciated ſubject, between the age of two and fourteen years.

Preparation. Make an inciſion through the integuments the whole length of the ſternum; then, with a ſaw, divide the ſternum longitudinally into two equal parts; introduce a diſſecting knife under the divided bone on each ſide, ſeparate it from the mediaſtinum, and lay open the thorax, by bending back the two portions of the ſternum and the cartilages of the ribs: an inciſion is then to be made into the pericardium, and the left ventricle of the heart, and a large pipe introduced into the aorta, and ſecured by a ligature. The ſubject is next to be put into warm water, and gradually heated. The time generally required to heat the whole ſubject is four hours, in a large body of water.

If the veins are to be injected, three more pipes are required: one to be put into the angular vein, at the corner of the orbit; another into a vein as near the fingers as poſſible; and the third into a vein as near to the toes as poſſible.

Injection. The ſubject and injection being properly heated, throw the coarſe red injection into the heart pipe, which will fill the arterial ſyſtem; and then the coarſe yellow injection into the head pipe firſt, and next into the pipes of the extremities. The ſubject, when injected, ſhould be put into cold water, with its face downwards.

Diſſection. Open the abdomen by an inciſion from the ſternum to the umbilicus, and from thence to each ilium. Cut away the abdominal viſcera, the ſtomach, ſpleen, and inteſtines; leaving the meſenteric veſſels as long as poſſible: diſſect away the liver, leaving the vena portæ and hepatic artery as long as poſſible. This done, diſſect away the fat and cellular membrane from the veſſels; ſecure the meſenteric veſſels in an arboreſcent form on a piece of paſteboard. The kidnies, urinary bladder, uterus, and its appendages, are to be preſerved and dried in their ſituations. From the thorax are to be removed, the lungs and heart, or the latter may remain. The integuments being carefully diſſected from the ſternum, it is to be bent back, and kept in that ſituation, to expoſe the internal mammary arteries. The diſſecting away the ſkin is next, in order to exhibit the muſcles, and expoſe the arteries and veins. The ſkin ſhould only be removed from time to time to carry on the diſſection, and never more than that covering the part to be diſſected; otherwiſe the parts from which the ſkin is removed will become dry, and the diſſection be ſpoiled. In diſſecting the arteries and veins, the diſſector will find no difficulty, if he proceeds cautiouſly from the larger trunks towards their extremities. The brain is to be removed by ſawing away a large portion of the bone on each ſide of the longitudinal ſinus of the dura mater. The cheeks ſhould be puſhed out by introducing horſe-hair into the mouth.

Drying. When diſſected, or before, the ſubject ſhould be hung up by the head in a frame: one arm is to be placed at a little diſtance from the ſide, and the other turned up over the head, with the palm of the hand in front: the legs at a little diſtance from each other, and kept in theſe poſtures by packthread. Should any muſcles obſtruct the ſight of the arteries, they are to be ſeparated to a proper diſtance by pieces of wood. This done, expoſe it to a current of air, in a place where it cannot get wet; and if the weather be moiſt, remove, from time to time, all moiſture, by a ſoft ſponge.

Preſervation. Varniſh it ſeveral times, and keep it in a dry place, and in a proper caſe, with a glaſs front and back.

A HEAD, FOR ARTERIES AND VEINS.

Chooſe an emaciated head of an adult, ſeparated from the body, by a tranſverſe ſection, about the ſixth or ſeventh vertebra.

Preparation. Put a pipe into each carotid, or, what is better, one pipe with a bifurcation: remove a portion of bone over the longitudinal ſinus of the dura mater, about the middle of the parietal bones, and ſecure a pipe in the longitudinal ſinus, pointed towards the occiput. Put the head into warm water, to ſoak, preſſing the blood occaſionally out of the external and internal jugulars. Then tie up the jugular veins and vertebral arteries, and all the ſmall veſſels.

Injection. Into the carotids throw the red injection, and the yellow, or dark blue, into the pipe in the ſinus of the dura mater. The former will fill the arteries, the latter the veins.

Diſſection. Follow the courſe of the larger trunks, diſſect out the globes of the eyes, and remove, with a fine ſaw, the portion of the jaw-bone behind the laſt molaris, to ſhow the courſe of the internal carotids. To prepare the whole head, a portion of the cranium muſt be removed, by ſawing on one ſide of the longitudinal ſinus of the dura mater, from the frontal ſinus to the horizontal ſpine of the occipital bone, and then ſawing horizontally above the ear, from one extremity of the former inciſion to the other. The dura mater ſhould be removed with a pair of ſciſſars, the brain carefully waſhed out, and the tentorium and falx preſerved. It is better to make a perpendicular ſection of the head, a little to one ſide of the ſagittal ſuture, through the noſe, foramen magnum, and vertebræ; and thus prepare each ſide. The courſe of the cervical artery is to be ſhown by diſſecting away the muſcles, &c. from between the tranſverſe proceſſes.

Preſervation. Varniſh it ſeveral times, and keep it in a glaſs caſe, ſuſpended; or fix it by the neck, and cover it with a glaſs bell.

AN ARM, FOR ARTERIES AND VEINS.

Remove the ſuperior extremity from the trunk, by ſeparating the clavicle from the ſternum, raiſing it, and paſſing the knife under it to the articulation, including the greater part of the pectoral muſcle. Then cut under the ſcapula, ſo as to remove with the arm the clavicle, ſcapula, and ſubſcapularis muſcle.

Preparation. After ſoaking it in warm water, force out the blood from the veins, by preſſing the extremity from the fingers towards the ſhoulder. Fix a pipe in the axillary artery, and another in the largeſt vein on the back of the hand; ſome warm water may be injected into the vein, ſo as to waſh out the blood; and, when preſſed out, the axillary vein ſhould be tied. Tie any muſcular branches that may be gaping.

Injection. Red injection may be thrown into the artery, and yellow, or dark blue, into the vein.

Diſſection. This is very ſimple; it requires only the removal of all the cellular and fatty membrane, and expoſing the courſe of the veſſels. Tie up the limb by the clavicle.

Preſervation. When varniſhed, keep it in a cool and dry place.

A LOWER EXTREMITY, FOR ARTERIES AND VEINS.

Having removed the contents of the abdomen, make a ſection through the ſymphyſis of the pubis, and the ligaments connecting the ilium and ſacrum, ſo as to remove one ſide of the pelvis.

Preparation. Fix a pipe in a vein as near the toes as poſſible, and another in the iliac artery. When the limb has been well ſoaked in warm water, preſs out the blood from the veins, or throw in ſome warm water at the venal pipe; but carefully preſs it out again, and tie up the iliac vein. Secure all divided veſſels.

Injection. Blue injection, or yellow, may be put into the vein, and red into the artery.

Diſſection. Expoſe the courſe of the artery and veins, particularly the profunda of the thigh.

THE GRAVID UTERUS, FOR ARTERIES AND VEINS.

The gravid uterus, or the uterus ſoon after it has expelled the fœtus, may be injected, to ſhow its large and tortuous veſſels. It may be injected whilſt in the body; but this is always attended with much difficulty, and never ſucceeds ſo well as when removed from the body. Therefore ſeparate the ſpermatic and hypogaſtric veſſels as far from the uterus as poſſible, and cut out the uterus with the bladder, vagina, and external parts of generation.

Preparation. Put a pipe in each ſpermatic artery, and each hypogaſtric, and alſo one into each ſpermatic and hypogaſtric vein; ſo that, at leaſt, there will be four pipes for arteries, and four for veins, neceſſary. Be very careful that all the divided veſſels be ſecured by ligature, which only can enſure ſucceſs.

Injection. Red and yellow are moſtly preferred; the former for the arteries, the latter for the veins. Be careful that the red be thrown into all the arterial pipes, and the yellow into the venal; and, to prevent miſtakes, it will be better to have the pipes of the veins different from thoſe of the arteries.

Diſſection. Diſtend the vagina and uterus with horſe-hair, either by introducing it through the vagina, or, if the fœtus be in it, by a perpendicular ſection through the anterior parietes, which is to be ſewed up again. Then diſſect away all looſe cellular ſtructure and fat, preſerving the round and broad ligaments, and Fallopian tubes. Should the fœtus be in the uterus, an inciſion ſhould be made, as above directed, except the placenta be adhering there, which is known by the great number of veſſels, and then on the oppoſite ſide, and through the membranes, to remove the child; cut the umbilical cord cloſe to the fœtus, and fix a pipe in one umbilical artery, and another in the umbilical vein, the latter carrying arterial blood, ſhould be filled with red injection, and the artery with yellow; the cord is to be laid round the placenta.

Preſervation. When well varniſhed, ſuſpend it in a caſe, with a glaſs front and back.

A PLACENTA, FOR ARTERIES AND VEINS.

This is perhaps the eaſieſt preparation to make with coarſe injection; and ſhould, therefore, be the firſt attempt of the ſtudent.

Preparation. Fix a large pipe in the vein, and a ſmall one in one of the arteries. The difficulty uſually attendant on getting the pipe into the artery is obviated in a great meaſure by introducing the point of the ſciſſars into theſe veſſels, and ſlitting them down for about half an inch, then ſpreading the artery open upon the fore-finger, and keeping it ſo by preſſure with the thumb, by which the pipe may be carried in without difficulty. A ligature ſhould be paſſed round each pipe with a needle, taking care not to puncture any of the veſſels.

Injection. The uſual colours are to be ſelected; but inſtead of throwing the yellow into the vein, it ſhould be puſhed into the artery, for the artery here performs the function of a vein, and *vice verſa.* When there are two placentæ there ſhould be different colours uſed.

Diſſection. The ſpongy ſubſtance is to be carefully diſſected away from the injected veſſels, the placenta ſoaked in cold water, to get rid of its blood, and then dried, curling the cord around it; and ſhould the membranes not be much torn, they may be diſtended with curled hair over it.

Preſervation. Varniſh it well; fix its bottom in a caſe with a glaſs top.

THE HEART, IN SITU; WITH THE HEAD, AND ADJACENT VESSELS.

For this purpoſe chooſe the head of a young ſubject, or an adult, whoſe heart is free from fat. The liver, ſtomach, ſpleen, &c. are to be removed from the abdomen, and the aorta divided juſt as it gives off the cœliac artery. The inciſion into the cheſt ſhould be carried through the integuments, from the trachea to the enſiform cartilage, the ſternum ſawed through, and bent one half on each ſide, from the extremity of the cartilages neareſt the ribs; then divide one of the pulmonary veins as near as poſſible to the lungs, and remove a portion of bone over the longitudinal ſinus of the dura mater.

Preparation. Having well ſoaked the parts in warm water, and ſqueezed the blood from the heart and veſſels, by the inferior cava and pulmonary vein, put a pipe into the longitudinal ſinus of the dura mater, pointed towards the occipital bone, another into the pulmonary vein, a third into the vena azygos, and one into the receptaculum chyli, or thoracic duct. Tie up carefully the aorta and the vena cava inferior, and put a ſtrong ligature around the middle of each arm.

Injection. Three colours are required :—one for the arteries, which ſhould be red ; another for the veins, which may be yellow or blue ; and the third for the thoracic duct, which ſhould be white, to imitate chyle. Throw the red injection into the pipe in the pulmonary vein, which will fill the left auricle, ventricle, aorta, and all the arteries. The pipe in the head is for the yellow injection : by this will be filled the veins of the head, face, neck, and cheſt, the right auricle of the heart, the right ventricle, and the pulmonary arteries. Should the vena azygos not be injected, the yellow injection is to be thrown into it. A ſmall quantity of white injection is ſufficient for the thoracic duct.

Diſſection. Remove the body by a tranſverſe ſection at the laſt dorſal vertebra, then amputate the arms at their middle, ſaw away one ſide of the bones of the ſkull, and waſh away the brain : then diſſect away all the looſe cellular membrane and fat, and expoſe the various parts in the beſt manner ; diſſect away the lungs, leaving the pulmonary arteries as long as poſſible.

Preſervation. This is, when well done, a valuable preparation, and deſerving of great care. Varniſh it well, and preſerve it in a ſquare glaſs caſe.

A FŒTUS,

A FŒTUS, TO EXHIBIT THE PECULIARITIES OF ITS CIRCULATION.

For this purpoſe ſelect a ſtill-born fœtus; and, if poſſible, one that died from a flooding of the mother.

Preparation. Diſſect the umbilical vein from the arteries, about four inches from the umbilicus, and fix a pipe in it, taking care not to include the arteries. Throw warm water into this pipe, and waſh out the blood, which will flow out by the umbilical arteries. Having drained away as much of the water as poſſible, tie a ligature very looſe on the umbilical arteries.

Injection. The fœtus being heated, throw in gently any coloured injection. The water will come away firſt through the umbilical arteries; and, when the injection appears, make the ligature firm, to prevent its further egreſs.

Diſſection. The peculiarities in the fœtal circulation are the umbilical cord, the ductus venoſus, the ductus arterioſus, and foramen ovale. When the body is cold, proceed to the diſſection; remove the head from the cervical vertebræ, the arms, with the ſcapulæ, and pectoral muſcles; the inferior extremity at the articulation with the pelvis, the whole of the parietes of the abdomen, leaving the arteries running to the cord by the ſides of the bladder; the anterior part of the thorax, with the ſternum, cartilages, and part of the ribs, the integuments and muſcles of the back. Next cut away the lungs, and remove the pericardium; keep the diaphragm in its place, and turn up the liver, ſo as to expoſe the ductus venoſus. Some diſſection and care is here neceſſary. Diſſect away the ſtomach and inteſtines, and lay out the meſenteric veſſels, diſtend the bladder with air, and cut away any thing that may obſtruct the view of the veſſels. The foramen ovale cannot be exhibited.

Preſervation. After having varniſhed it, hang it in a glaſs bell, with a hook at its top.

PENIS.

The penis may be injected, to ſhow the two corpora cavernoſa, the corpus ſpongioſum, and glans, with the arteries and veins. For this purpoſe any healthy penis will do, but large ones are generally preferred. Having cut through the integuments and ſoft parts in the pelvis, in the direction the ſaw is to be paſſed, ſaw through the middle of each criſta of the pubis, ſtraight down and through the aſcending ramus of each iſchium, cloſe to their commencement, and thus remove the pubis, with the bladder and external parts of generation.

Preparation. Make an inciſion into either of the crura of the corpora cavernoſa, and into the bulbous part of the urethra, as near to the proſtate gland as poſſible; ſoak it in hot water, and carefully preſs out the blood from every part. Introduce a probe along the vena magna ipſius penis, by an inciſion at its root, to break down its valves; fix a pipe in each of theſe inciſions, and another in each vas deferens, at its entrance into the veſiculæ ſeminales, and ſecure all the divided veſſels.

Injection. Four colours are neceſſary; thoſe generally preferred are red, yellow, blue, and white. Throw the red into the corpus ſpongioſum, which will diſtend the glans; the yellow into the corpus cavernoſum pipe; the blue into the vena magna ipſius penis; and the white into the vaſa deferentia.

Diſſection. Inflate the bladder, diſſect away all the ſoft parts, and keep the penis erect againſt the ſymphyſis pubis.

Preſervation. In a covered box.

TESTICLE.

A teſticle of an adult ſhould be choſen free from diſeaſe, and great care is requiſite in removing it from the body. Firſt, enlarge the ring of the oblique muſcle, puſh the teſticle through from the ſcrotum, and ſeparate its cellular connecting ſubſtance; then cut the ſpermatic artery and pampiniform plexus as high as poſſible, and then the vas deferens.

Preparation. When well ſoaked, preſs out the blood from the veins; put a pipe into the ſpermatic artery, and another into a vein; and ſecure all other open mouths.

Injection. Red is to be ſent into the artery, and yellow or blue into the vein, which is without valves. Then fix the quickſilver tube in the vas deferens, and ſuſpend it in water; this done, fill it with mercury, and in twenty-four hours it may be removed to be diſſected.

Diſſection. Cut away the tunica vaginalis, and the tunica albuginea, which requires great care; then remove all the cellular and adipoſe membrane, and dry it on a board previouſly waxed.

Preſervation. In a common preparation glaſs, on a blue or green paper ground.

THE SYSTEM OF THE VENA PORTÆ.

Remove the liver, ſpleen, ſtomach, and inteſtines all together, of a perſon whoſe meſentery is free from fat, cutting away at the root of the meſentery, behind the peritoneum.

Preparation. Cut into a meſenteric vein, as near to the inteſtine as poſſible, and ſecure it with a ligature paſſed around it with a needle, taking care not to wound any other vein. Inject warm water, and let it again run out by the divided veſſels. Drain its water off, and ſecure all the veins, the hæmorrhoidal eſpecially.

Injection. Throw any colour into the pipe, which will paſs into the ſplenic, meſenteric, and internal hæmorrhoidal vein, and into the vena portæ.

Diſſection. Remove all the ſoft parts; the ſtomach, ſpleen, and inteſtines; cutting the veſſels as long as poſſible, and dry them in the beſt manner, either attached to the liver, or diſſect away the liver from the vena portæ, taking care to preſerve ſome of its ramifications.

Preſervation. In a covered box.

HEART.

The heart is moſtly injected out of the body, to ſhow its common and proper veſſels. For this purpoſe, chooſe a lean heart. Cut through the thoracic viſcera immediately at the top of the thorax; divide the intercoſtal arteries by drawing the knife down the pleura, over the ribs beyond their origin, ſeparate the vena cava inferior and aorta, in the abdomen, with the cavæ hepaticæ; and remove the thoracic viſcera, with the portion of the diaphragm ſurrounding the veſſels.

Preparation. Soak the blood and coagula out of the cavities of the heart, and preſs the blood from the coronaries. Put a pipe into the vena cava ſuperior, and another into one of the pulmonary veins. Then tie the lungs at their root, the vena cava inferior, the arteria innominata, the left carotid and ſubclavian; and paſs a ligature, with a ſlip knot, round the ſinus of the aorta, and ſecure all other open veſſels.

Injection. The common coloured injections, red and yellow, only are wanted. Throw the former into the pulmonary vein, which will fill the left auricle, ventricle, aorta, and coronary arteries. The yellow, being ſent into the ſuperior cava, will diſtend the right auricle, coronary veins, right ventricle, and pulmonary artery. In order to fill the coronaries well, the injector muſt ſtop two or three times in the courſe of the proceſs, to ſqueeze on the injection in them with his nail; then heat the whole again, and throw in more injection. The preparation having cooled, a pipe is to be fixed at the bottom of the aorta, and ſome red injection, juſt hot enough to run through the ſyringe, is to be puſhed along the aorta, an aſſiſtant throwing cold water on the intercoſtals, if the injection runs through them.

Diſſection. Cut away the lungs, pericardium, and all the ſoft parts.

Preſervation. Either in a covered box, or under a glaſs bell.

STOMACH. INTESTINES. BLADDER.

Theſe are beſt injected with the whole ſubject, but may be removed and injected ſeparately.

GENERAL OBSERVATIONS.

1. The anatomiſt can only ſucceed by having the preparation conſtantly heated as he is throwing in the injection.

2. The injection ſhould be thrown in very gradually.

3. When injected, the part ſhould be immediately immerſed in cold water.

PREPARATIONS WITH MINUTE INJECTION.

BONES.

The vaſcularity of bones is to be demonſtrated, by throwing fine injection into an extremity, cutting out the bone when cold, ſeparating it from all the ſoft parts, immerſing it in water for a few days, to ſoak out the blood, and then putting it into a mixture of muriatic acid and water in the proportion of one ounce to a quart, for three or four months, adding about, every month, a drachm of acid. The limb of a ricketty child is to be choſen.

Injection. Put a pipe into the largeſt artery of the extremity, and throw gradually the red injection into it, fixing the ſtop-cock in the pipe.

A FŒTUS.

Still-born children, when injected with minute injection, afford a number of beautiful preparations.

Preparation. No water ſhould be thrown into the veſſels. Fix a pipe with a ſtop-cock into the umbilical vein, and tie the arteries in the ligature.

Injection. Red injection is always choſen for this purpoſe; and throw it in with great care, until the abdomen and ſkin all over become very tumid. Firſt mucus comes from the noſe and mouth, then the meconium from the anus, and often pure ſize.

Diſſection. Cut off the head from the ſhoulders, the arms below the ſhoulder joint, and the legs juſt below the acetabulum; then preſerve a ſmall quantity of the integuments around the navel, and remove all the anterior parietes of the abdomen and cheſt, ſo as to exhibit the thoracic and abdominal viſcera. Cut away the integuments and poſterior part of the theca vertebralis, to exhibit the medulla ſpinalis.

Preſervation. Soak out the blood, and preſerve it in proof ſpirit, to ſhow the viſcera and their vaſcularity.

From a well-injected fœtus may be obtained the following preparations:

1. If the fœtus be about ſeven months old, the *membrana pupillaris.*

2. If it be male of this age, the *teſticle* in the abdomen, with the *gubernaculum.*

3. The *vaſcular* and radiated fibres of the *parietal bones.*

4. The *vaſcular membrane,* including the *teeth.*

5. The *viſcera of the cheſt* ſeparate, if better injected than thoſe of the abdomen, ſhowing the vaſcularity of the lungs, thymus gland, and heart.

6. The *ſtomach,* which is to be inverted, to ſhow its vaſcular *villous coat.*

7. The *inteſtines,* which are to be ſeparated from the meſentery, and inverted, to ſhow their *villous coat.*

8. The *glandulæ renales* and *kidnies* together, to exhibit their relative ſize, and the lobulated ſtructure of the kidney.

9. The *uterus and its appendages,* to ſhow the long ovaria and plicæ of the neck of the uterus and vagina.

10. The external parts of the female organs of generation, to ſhow the *hymen.*

11. A red portion of the *ſkin,* to exhibit its vaſcularity.

12. The *medulla ſpinalis,* to ſhow its veſſels, and the *cauda equina.*

13. The *membrana tympani,* to exhibit its vaſcularity.

14. The *cavity of the tympanum,* to ſhow its vaſcularity, and that of the perioſteum of its bones.

15. The *veſtibulum and cochlea,* to ſhow the membranous ſemicircular canals of the former, with their ampullæ injected, and the vaſcularity of the zona mollis.

16. The *head,* to ſhow the natural appearance of the face, the papillæ of the lips, tongue, &c.

17. The *hand,* to ſhow its natural colour.

Preſervation. The above preparations are all to be well ſoaked from their blood, and preſerved in proof ſpirit of wine.

18. A portion of *ſkin*, freed of its adeps, to ſhow its vaſcularity.

19. The *membrana tympani*, to ſhow its veſſels.

20. The *heart*, to ſhow the foramen ovale, by diſtending the cavities with air; and, when dry, cutting away the outermoſt ſides of the auricles, and introducing a briſtle.

21. Any large muſcle, freed from its cellular membrane and fat, and dried, to ſhow the *vaſcularity of the muſcle*.

Preſervation. Theſe are all to be dried, well varniſhed, and preſerved in bottles. Some prefer putting them into ſpirit of turpentine; but this ſhould be avoided as much as poſſible, for the turpentine is always oozing in warm weather, and dirtying the glaſs.

UTERUS.

The object of injecting a uterus with fine injection is to exhibit the vaſcularity of its internal membrane, which furniſhes the catamenia. For this purpoſe the uterus of a perſon whoſe menſtruation has not been ſtopped by age or diſeaſe is to be ſelected.

Preparation. Remove the uterus, by dividing the veſſels as long as poſſible, the round and broad ligaments, and as much as poſſible of the vagina. Tie a pipe in each hypogaſtric artery, and ſecure all the divided veſſels.

Injection. Any coloured injection may be choſen, but red looks beſt.

Diſſection. Cut away all the looſe cellular membrane, bladder, and rectum, if there be any, from around the vagina, and cut it open along the middle of its ſuperior part; continue this inciſion on each ſide of the anterior part of the uterus, ſo as to exhibit the poſterior ſurface of its cavity.

Preſervation. If the injection be ſucceſsful, which it ſeldom is more than one time in ten, ſuſpend it by the ligaments, and preſerve it in proof ſpirit.

AN ADULT HEAD.

Separate the head as low as the laſt cervical vertebra from the ſhoulders.

Preparation. Put a bifurcated pipe into the carotids. Secure the vertebral arteries and jugular veins, and all the divided parts.

Injection. The red injection is always preferred.

From an adult head injected in this way may be made the following preparations:

1. The upper eyelid, to ſhow the vaſcularity of *Meibomius's glands*.

2. The *choroid membrane*, exhibiting its vaſcularity.

3. The *retina*, ſuſpended by the optic nerve, exhibiting its vaſcularity.

4. A ſection of the optic nerve, to exhibit the *central artery*.

5. The whole of the *cerebrum*, *cerebellum*, and *medulla oblongata*, with the pia mater; or,

6. The pia mater, ſeparated from the convolutions of the brain, to exhibit the *intergyral proceſſes* and the *tomentum cerebri*.

7. One half of the noſtrils, to exhibit the vaſcularity of *Schneider's membrane*, and that of the membrane lining the antrum of Highmore.

8. The *tongue*, lying in the jaw, and ſuſpended by the *palatum molle*, with the poſterior fauces cut away, to ſhow the *epiglottis* and *glottis*, the *uvula* and *velum pendulum palati*, the tongue, its papillæ and excretory ducts, and the vaſcularity of the gums and *ſublingual glands*.

Preſervation. The above preparations are to be ſoaked well in cold water, to get out all the blood, and then preſerved in proof ſpirit.

PREPARATIONS WITH QUICKSILVER.

Mercury cannot be coloured by any ſubſtances; it muſt, therefore, always preſent the ſame ſilver colour.

GENERAL OBSERVATIONS.

1. The parts ſhould always be injected in a proper tray, that the mercury may be eaſily collected.

2. A lancet, with a curved needle ready threaded, ſhould be always at hand.

3. A bottle, whoſe neck is not ſo wide as to permit the quickſilver tube going to the bottom, when put into it.

4. When injecting, if any circumſtance render it neceſſary for the injector to put aſide the tube with the mercury, it ſhould be placed in the bottle, the mercury remaining in it, to be handy and prevent delay.

5. Injecting with mercury is always tedious, and frequently unſucceſsful. The parts expoſed muſt be kept moiſt, by ſprinkling them with cold water.

A SUPERIOR EXTREMITY.

To inject the lymphatics of an arm, chooſe one from a dropſical ſubject, without fat; make an inciſion into the ſkin around the wriſt, and ſeek diligently, with a magnifying-glaſs, for an abſorbent, into which the pipe is to be put, when the quickſilver will immediately run. The ſhoulder ſhould now be placed conſiderably lower than the hand; and, when the mercury runs out at the divided veſſels in the axilla, tie them up, and alſo the lymphatic, into which the pipe was introduced. Then ſeek for another abſorbent. When the mercury ceaſes to run in a lymphatic, tie the veſſel, and ſeek for another.

Diſſection. Begin at the lymphatics, where the mercury entered, and trace them; removing every thing that obſtructs their view, but preſerve the glands.

AN INFERIOR EXTREMITY.

The limb for this purpoſe ſhould alſo be taken from a dropſical perſon, and the ſame method adopted as with the ſuperior extremity, ſeeking as near to the toes as poſſible for the lymphatics.

A PAROTID GLAND.

Cut down upon the maſſeter muſcle, and ſeek for the Stenonian duct, which is the excretory duct of the parotid. Tie the quickſilver pipe in it, then fix the tube, and pour into it the quickſilver; and, when it ceaſes to run, remove the tube and pipe, and tie the duct. Be particularly careful, in diſſecting away the gland, not to cut it.

Preſervation. Dry it on a waxed board, and preſerve it on a blue paper and paſteboard, in ſpirit of turpentine.

LIVER.

The lymphatics running on the peritoneal coat of the liver, and over the gall-bladder, make a beautiful preparation. The liver ſhould be well ſoaked for ſeveral days, and the pipe put into the lymphatics of the ſuſpenſory and coronary ligaments, and the mercury forced along them, breaking down the valves with the nail, by preſſing on the mercury. Secure the veſſels at the portæ of the liver, when the mercury gets there, and tie the lymphatics when filled. Should the anatomiſt's attempt to force the quickſilver beyond the valves be unſucceſsful, he muſt fix upon the moſt minute obvious branch, and let it run its proper courſe.

Preſervation. Throw ſome coarſe injection into the cavæ hepaticæ and vena portæ, without heating the liver thoroughly; inflate the gall-bladder, and dry the whole. Varniſh it, and preſerve it in the beſt manner under a glaſs bell, or preſerve the injected part in proof ſpirit, without any wax injection.

LUNGS.

The ſuperficial lymphatics of the lungs are to be filled from the part moſt remote from the root of the lungs.

Preſervation. Cut away the part on which the lymphatics are filled. Dry it on a waxed board, varniſh it, and preſerve it in a bottle, on a green or blue piece of paper; or preſerve it in proof ſpirit, without drying it.

HAND.

Select the hand of an aged female (ſeparated from the arm by a tranſverſe ſection, three inches above the wriſt) that has died of a lingering diſeaſe. Soak out the blood in warm water; fix the pipe in the radial artery, then add the tube, and pour into it the mercury. As the mercury appears in the other arteries and veins, take them up and ſecure them with ligatures. Should the mercury ſtill eſcape from ſmall branches, put a cord round the arm, and with a piece of wood tighten it, by twiſting the wood, taking care not to prevent the mercury paſſing into the hand. Then ſuſpend the hand in a glaſs filled with water, and ſuſpend alſo the tube and quickſilver in the manner repreſented in the annexed plate, for a day or two, that the mercury may get into the ſmall veſſels. When injected, remove the pipe, and tie, by a ſtrong ſtring, the fore-arm; put the hand into water, until putrefaction ſeparates the cuticle.

Preſervation. Dry it carefully, and varniſh it; then fix the fore-arm in a pedeſtal of plaſter of Paris, and keep this beautiful preparation under a glaſs bell.

LACTEALS.

Remove the meſentery and inteſtines, if the former be perfectly free from fat, and let them remain ſeveral days in water, which ſhould be frequently changed. Search for an abſorbent, on the inteſtine, into which introduce the quickſilver, which will run on to the glands in the meſentery, where it will ſtop. When the lacteals are filled, the preparation will be more elegant if red and yellow coarſe injection be thrown into the meſenteric arteries and veins.

Preſervation. Spread the meſentery on a waxed board, inflate a portion of the inteſtine, clear away all that is uſeleſs; dry and varniſh, and preſerve it in a glaſs frame.

CORRODED PREPARATIONS.

These preparations are made by filling the veſſels with coarſe injection, and corroding the ſoft parts, ſo as to exhibit thoſe veſſels.

GENERAL OBSERVATIONS.

1. The liquor for corroſion is to conſiſt of three parts of muriatic acid, and one of water.

2. The liquor ſhould be kept in a well glazed earthen veſſel, with a top to it, alſo well glazed.

3. The part to be corroded ſhould be carefully moved in and out of this liquor, as the ſlighteſt force may break the veſſels.

4. When corroded, the pulpy fleſh is to be carefully waſhed away, by placing it under a cock of water, the water flowing very ſlowly; or, in ſome inſtances, by ſquirting it away.

5. When the preparation is freed of its fleſh, it ſhould be fixed in the ſituation it is to remain in, either in a plaſter of Paris pedeſtal, or on a flat ſurface.

6. If the fleſh be not perfectly deſtroyed, the preparation is to be returned to the corroding liquor for a fortnight or month longer, or until it becomes pulpy.

HEART AND LUNGS.

Theſe viſcera, occupying leſs ſpace in children than adults, are to be preferred. It is of no conſequence whether they are fat or lean. The integuments ſhould be cut from the fore part of the neck; and the trachea, jugular veins, and carotid arteries removed, and, with them, the viſcera of the thorax, carefully ſeparating the ſubclavian veſſels from the clavicle, without injuring them, and dividing the axillary veſſels and the cava inferior and aorta, juſt below the diaphragm.

Preparation. Soak the whole well, to free it of its blood, and preſs out all the fluids: fix a pipe in the inferior cava, and another in one of the pulmonary veins, taking care not to injure the others, by tying it. Then ſecure the carotids, the jugulars, the axillary veſſels, the vertebral artery, the intercoſtals, the aorta, after it has formed its arch, the internal mammaries, and every veſſel that can be found.

Injection. Red and yellow are generally preferred, but red and blue are more proper, and more elegant. Throw the blue into the vena cava inferior, which will diſtend the right auricle, the ſuperior cava, the jugular veins, and great coronary vein, the right ventricle, and pulmonary arteries. The red injection will fill the left auricle and pulmonary veins, the aorta, ſubclavians, carotids, &c.

Preſervation. Great care is requiſite in freeing the injection from the pulpy fleſh. When done, let the apex of the heart be placed immediately in a plaſter of Paris pedeſtal, and cover it with a glaſs. If the pulmonary veſſels are well preſerved, it forms a valuable preparation. If one good preparation be obtained in ten trials, it will amply repay the anatomiſt.

HEART.

A fat heart will do for this purpoſe. Inject it as directed in page 287, and put it into the corroding liquor.

Preſervation. Lay it on ſome cotton, on a pedeſtal, and cover it with a glaſs.

LIVER.

The liver of a child is to be preferred to that of an adult, it occupying much leſs room: its veſſels ſhould be cut long, and with it the portion of the duodenum, perforated by the bile duct.

Preparation. Fix a pipe into the hepatic artery, another into the vena portæ, a third into the ductus communis choledochus, and a fourth in the vena cava hepatica.

Injection. The four injections are the red, yellow, dark blue, and light blue. Firſt, throw the red injection into the hepatic artery, next the dark blue into the vena portæ, then the light blue into the cavæ hepaticæ, and laſtly, the yellow into the ductus communis choledochus.

Preſervation. Remove the pipes as ſoon as the injection will permit; and, when corroded, fix the trunks in the beſt manner poſſible, upon a proper pedeſtal: then waſh away the fleſh, dry it, and cover it with a glaſs.

KIDNEY.

Chooſe the kidney of an old drunkard. Cut the emulgent veſſels cloſe to the aorta and cava, and the ureter, very low; then remove the kidney, with all its ſurrounding adeps.

Preparation. Soak out the blood, and preſs out all the fluid. Fix a pipe in the emulgent artery, another in the vein, and a third in the ureter; and tie up all the open-mouthed veſſels.

Injection. Red, blue, and yellow. Firſt throw the yellow into the vein, then the red into the artery, and laſtly, the blue into the ureter.

Preſervation. Under a glaſs bell. The kidneys of different animals form a beautiful exhibition.

A
GLOSSARY;
OR,
Explanation of Anatomical Terms.

A

ABDŌMEN. *The cavity of the belly*; from *abdo* to hide, as including the inteſtines and other viſcera.

ACETĀBŬLUM. *The cavity which receives the head of the thigh bone*; from *acetum* vinegar: ſo called, becauſe it repreſents the acetabulum or ſaucer of the ancients, in which vinegar was held for the uſe of the table.

ACĬNI. *A ſpecies of gland*; from *acinus* a grape.

ACRŌMĬON. *A proceſs of the ſcapula*; from *ακρος* extremity, and *ωμος* the ſhoulder.

ADENOLOGY. *The doctrine of the glands*; from *αδην* a gland, and *λογος* a diſcourſe.

AMNĬON. *A membrane that ſurrounds the fœtus, which is ſoft and ſhaggy*; from *αμνιος* a lamb's ſkin.

AMPHYARTHRŌSIS. *A ſpecies of connexion of bones, which admits of an obſcure motion*; from *αμφω* both, and *αρθρωσις* an articulation.

ANASTOMŌSIS. *The communication of veſſels with one another*; from *ανα* through, and *ϛομα* a mouth.

ANATOMY. *The diſſection of the human body*; from ανα, and τεμνω to diſſect.

ANCON. *The elbow*; from αγκων, from αγκαζομαι to embrace, απο τȣ αγκεισθαι ετερω οϛεω το οϛεον, becauſe the bones meeting, and being there united, are folded one into another.

ANCONEUS. *A muſcle*; ſo called from αγκων the elbow.

ANCONOID. *Proceſs of the cubit*; from αγκων the elbow, and ειδος ſhape.

ANGIOLOGY. *The doctrine of the veſſels*; from αγγειον a veſſel, and λογος a diſcourſe.

AORTA. Αορτη; from αηρ air, and τηρεω to keep: *an artery* ſo called becauſe the ancients ſuppoſed that only air was contained in it. It may rather be derived from αειρω to convey, as ſerving to convey the blood to the reſt of the body.

APONEURŌSIS. *A tendinous expanſion*; from απο from, and νευρον a nerve; from an erroneous ſuppoſition of the ancients, that it was formed by an expanſion of a nerve.

APŌPHȲSIS. *A proceſs of a bone*; from αποφυω to proceed from. A ſynonym of proceſs.

ARACHNOIDĒS. *A net-like membrane*; from αραχνη a ſpider, and ειδος likeneſs.

ARTERY. From αηρ air, and τηρεω to keep; becauſe the ancients ſuppoſed that only air was contained in them.

ARTHRODĬA. *A ſpecies of connexion of bones*; from αρθροω to articulate.

ARYTÆNOIDĒS. *The name of two cartilages of the larynx*; alſo applied to *ſome muſcles of the larynx*; from αρυταινα a funnel, and ειδος ſhape.

ASTRĀGĂLUS. *A bone of the tarſus*; ſo called from its reſemblance to a die uſed in ancient games, from αϛραγαλος a cockal or die.

ATLAS. *The firſt vertebra of the neck*; ſo called, becauſe it ſuſtains the head; from the fable of Atlas being ſuppoſed to have ſupported the world; or from ατλαω to ſuſtain, becauſe it ſuſtains the head.

Azygos. *A term applied to parts without a fellow*, from α priv. and ζυγος a yoke, becauſe it has no fellow.

B

Brachium. *The arm*; hence *os brachii, brachialis externus*, &c. from βραχυς ſhort, becauſe in a well-proportioned man it is ſhorter from the ſhoulder to the hands than from the hip to the feet.

Bronchia. *The ramifications of the trachea or windpipe*; from βρεχω to pour, becauſe the ancients believed that the fluids were conveyed into the ſtomach by the bronchia.

Bursa. *A bag*; from βυρσα: generally applied to the burſæ mucoſæ.

Bursalogy. *The doctrine of the burſæ mucoſæ*; from βυρσα a bag, and λογος a diſcourſe.

C

Calvaria. *The top of the cranium*; from *calvus* bald.

Cancelli. *Lattice work*; generally applied to the reticular ſubſtance in bones.

Cardia. *The ſuperior opening of the ſtomach*; from καρδια the heart, becauſe it is ſituated near it.

Carotid. *The name of ſome arteries of the neck and head*; from καροω to cauſe to ſleep; for, if tied with a ligature, the animal becomes comatoſe, or has the appearance of being aſleep.

Carpus. Καρπος; *the wriſt.*

Chorion. *The external membrane of the fœtus in utero.* Χωριον, from χωρεω to eſcape, becauſe it always eſcapes from the uterus with the fœtus.

CHOROID. From χωριον the chorion, and ειδος likeneſs; ſo called on account of the many blood-veſſels reſembling the chorion.

CLAVĪCŬLA. *The clavicle or collar-bone,* a diminutive of *clavis* a key; ſo called from its reſemblance to an ancient key.

CLINOID. *Four proceſſes of the ſella turcica of the ethmoid bone;* are ſo called, from κλινη a bed, and ειδος likeneſs, from their ſuppoſed reſemblance to a couch.

CLĪTŎRIS. *A part of the female pudenda, encloſed by the labia majora*; from κλειω to encloſe or hide.

CŌLON. *The firſt of the large inteſtines*; from κωλον, quaſi κοιλον, from κοιλος hollow; it generally being found empty, and full of wind, in the dead body.

CONDYLE. *An eminence in any of the joints*; κονδυλος, from κονδυ an ancient cup ſhaped like a joint.

CORĂCO. Names compounded with this word belong to muſcles, which are attached to the coracoid proceſs of the ſcapula; as coraco-hyoideus, &c.

CORACOID. From κοραξ a crow, and ειδος reſemblance, ſhaped like the beak of a crow.

CORONARY. From *corona* a crown. *The veſſels of the heart, ſtomach,* &c. are ſo called becauſe they ſurround the parts in the manner of a crown.

CORONOID. A proceſs ſo called, from κορωνη a crow, and ειδος likeneſs, from its reſemblance to a crow's beak.

COTY̆LOID. From κοτυλη the name of an old meaſure, and ειδος reſemblance; *reſembling the kotule.*

CRĀNĬUM. *The ſkull*; κρανιον, quaſi καρανιον, from καρα the head.

CREMASTER. *A muſcle* ſo called; from κρεμαω to ſuſpend, becauſe it ſuſpends the teſticle.

CRIBRIFORM. From *cribrum* a ſieve, it being perforated like a ſieve.

CRICOID. *Annular, round, like a ring*; from κρικος a ring, and ειδος likeneſs.

CRURA. The plural of *crus*, a leg or root; applied to ſome parts of the body, from their reſemblance to a leg or root, as crura cerebelli, &c.

CUBOIDES. *A bone of the foot*; from κυβος a cube, and ειδος likeneſs; becauſe it reſembles a cube.

CUNEIFORM. *Some bones are ſo called*; from *cuneus* a wedge, and *forma* likeneſs; being ſhaped like a wedge.

D

DARTOS. *A muſcle of the ſcrotum*; from δερω to excoriate.

DELTOID. *A muſcle reſembling the Greek letter* Δ; from Δ, and ειδος reſemblance.

DIAPHRAGM. *The muſcle which ſeparates the thorax from the abdomen*; from διαφραττω to divide.

DIARTHRŌSIS. *A moveable connexion of bones*; from διαρθροω to articulate.

DIGASTRIC. From δις twice, and γαστηρ a belly; having two bellies.

DIPLŎE. *The ſpongy ſubſtance between the two tables of the ſkull*; from διπλοω to double.

DUODĒNUM. *The firſt portion of the ſmall inteſtines*; ſo called becauſe the ancients ſuppoſed that it did not exceed the breadth of twelve fingers; from *duodenus*, conſiſting of twelve.

DURĂ MATĔR. *The outermoſt membrane of the brain*; called *dura*, becauſe it is much harder than the other membranes, and *mater*, from the ancients ſuppoſing it was the ſource of all the other membranes.

E

Embry̆o. *The child in the womb* is ſo called before the fifth month, after which it is termed *fœtus*; from εμβρυω to bud forth.

Enarthrōsis. *An articulation of bones*; from εν in, and αρθρον a joint or articulation.

Enteric. *Belonging to the inteſtines*; from εντερον an entrail or inteſtine.

Epidermis. *The ſcarf or outermoſt ſkin*; from επι upon, and δερμις the ſkin.

Epididy̆mis. *The ſmall oblong body which lies above the teſticles*; from επι upon, and διδυμος a teſticle.

Epigastric. *The ſuperior part of the abdomen*; from επι upon, and γαστηρ the ſtomach.

Epiglŏttis. *A cartilage of the larynx* ſo called; from επι upon, and γλωττις the aperture of the larynx, being ſituated upon the glottis.

Epīphy̆sis. *A portion of bone growing upon another bone, but ſeparated from it by cartilage*; from επι upon, and φυω to grow.

Epīploon. *The membranous viſcus of the abdomen, which covers the inteſtines, and hangs to the bottom of the ſtomach*; from επιϖλεω to ſwim upon.

Epistrophæus. *The ſecond vertebra of the neck*; from επιστροφαω to turn round, becauſe the head is turned upon it.

Ethmoid. From εθμος a ſieve, and ειδος reſemblance; being perforated like a ſieve.

F

Fascĭa. *An expanſion of a muſcle, encloſing others like a band*; from *faſcis* a bundle.

Falciform. *Shaped like a ſcythe*; from *falx* a ſcythe.

FASCĬCŬLUS. *A little bundle*, dim. of *faſcis* a bundle.

FAUCES. The plural of *faux* the top of the throat.

G

GALACTOPHOROUS. From γαλα milk, and φερω to carry; conveying the milk.

GANGLION. Γαγγλιον, a knot in the courſe of a nerve.

GASTROCNĒMĬUS. *The muſcle which forms the thick of the leg*; from γαστηρ a belly, and κνημη the leg.

GENĬO. Names compounded with this word belong to muſcles which are attached to the chin, as genio-gloſſus—genio-hyoideus—genio-pharyngeus, &c.; from γενειον the chin.

GENU. *The knee*; from γονυ, παρα το εις γην νευειν, becauſe by it the body is bent towards the earth.

GINGLY̆MUS. *An articulation*; from γιγγλυμος a hinge.

GLENOID *cavity*. From γληνη a cavity, and ιδος reſemblance.

GLOMER. *A convoluted bundle of veſſels*; generally applied to the lymphatic glands.

GLOSSO. Names compounded with this word belong to muſcles, which are attached to the tongue; as gloſſo-pharyngeus—gloſſo-ſtaphylinus, &c.; from γλωσσα the tongue.

GLOTTIS. *The ſuperior opening of the larynx at the bottom of the tongue*; from γλωττα the tongue.

GLUTÆUS. *The name of a muſcle*; from γλουτος the buttocks.

GOMPHŌSIS. Γομφωσις inclavation, *a ſpecies of immoveable connexion of bones*; from γομφος a nail, becauſe one bone is fixed in another bone like a nail in a board.

H

HARMŌNIA. *A ſpecies of immoveable connexion of bones*; ἁρμονια, from ἀρω to fit together.

Hĕlix. *The outward circle of the ear*; from ειλω to turn about.

Hēpar. *The liver.* Ἡπαρ, *an abdominal viſcus.*

Hyaloid. From ὑαλος glaſs, and ειδος likeneſs; the capſule of the vitreous humour of the eye is ſo called, from its *tranſparent* and *glaſſy appearance.*

Hygrology. *The doctrine of the fluids*; from ὑγρος a fluid, and λογος a diſcourſe.

Hymen. *The membrane ſituated at the entrance of the virgin vagina*; from Ὑμην Hymen, the god of marriage.

Hyo. Names compounded with this word belong to muſcles which are attached to the os hyoides, as hyo-gloſſus—hyo-pharyngeus—hyo-thyroides; from ὑοειδες the os hyoides.

Hyoidēs. *A bone of the tongue, ſo called from its reſemblance to the Greek* υ; from υ, and ειδος reſemblance.

Hўpŏchōndrĭum. *That part of the body which lies under the cartilages of the ſpurious ribs*; from ὑπο under, and χονδρος a cartilage.

Hypogastric. *The lower region of the fore part of the abdomen*; from ὑπο under, and γαστηρ the ſtomach.

I

Ilĕum. *A portion of the ſmall inteſtines*; from ειλεω to turn; being always convoluted.

Ilium. *Part of the os innominatum,* ſo called becauſe it ſupports the ειλεια or ſmall inteſtines.

Ischĭum. *The part of the os innominatum upon which we ſit*; from ισχυω to ſuſtain.

L

Lacŭna. *The excretory duct of the glands of the urethra and vagina*; from *lacus* a channel.

LAMBDOIDAL *ſuture.* So called becauſe it is ſhaped like the letter λ; from λ, and ειδος reſemblance.

LARYNX. *The ſuperior part of the windpipe*; λαρυγξ the larynx.

M

MASSĒTER. *A muſcle of the face, which aſſiſts in the action of chewing*; from μασσαομαι to chew.

MASTOID. From μαςος a breaſt, and ειδος likeneſs; *ſhaped like a nipple or breaſt.*

MEDIASTĪNUM. *The production of the pleura, which divides the thorax into two cavities*; from *medium* the middle, *quaſi in medio ſtare.*

MESENTERY. *The membranes to which the inteſtines are attached*; from μεσος the middle, and εντερον an inteſtine, becauſe it is in the middle of the inteſtines.

MESOCŌLON. *That part of the meſentery in the middle of the colon*; from μεσος the middle, and κολον the colon.

METACARPUS. *That part of the hand between the carpus and fingers*; from μετα after, and καρπος the wriſt.

METATARSUS. *That part of the foot between the tarſus and toes*; from μετα after, and ταρσος the tarſus.

MYLO. Names compounded with this word belong to muſcles which are attached near the grinders, as *mylo-hyoides—mylo-pharyngeus*, &c.; from μυλη a grinder tooth.

MYOLOGY. *The doctrine of the muſcles*; from μυς a muſcle, and λογος a diſcourſe.

N

NEUROLOGY. *The doctrine of the nerves*; from νευρον a nerve, and λογος a diſcourſe.

O

Odontoid. *Tooth-like*; from οδους a tooth, and ειδος reſemblance.

Œsophăgus. *The canal leading from the pharynx to the ſtomach*; from οιω to carry, and φαγω to eat; becauſe it carries the food into the ſtomach.

Olecranon. *The elbow, or head of the ulna*; from ωλενη the cubit, and κρανον the head.

Omentum. *An abdominal viſcus*; ſo called from *omen* a gueſs; becauſe the ſoothſayers propheſied from the inſpection of this part.

Omo. Names compounded with this word belong to muſcles which are attached to the ſcapula, as *omo-hyoideus*, &c.; from ωμος the ſhoulder.

Omoplăta. *The ſcapula* or *ſhoulder-blade*; from ωμος the ſhoulder, and πλατυς broad.

Orgasm. *A violent ſalaciouſneſs, attended with turgeſcence in the parts*; from οργαω to deſire vehemently.

Osteology. *The doctrine of the bones*; from οστεον a bone, and λογος a diſcourſe.

P

Pancreas. *A viſcus of the abdomen*; ſo called from its fleſhy conſiſtence; from παν all, and κρεας fleſh.

Parenchȳma. *The ſubſtance connecting together the veſſels*, &c. of the lungs is ſo called, from παρεγχυω to pour through.

Parotid *gland*; from παρα near, and ους the ear; becauſe it is ſituated near the ear.

Pelvis. *A bony cavity ſhaped like a baſon*; from πελυς a baſon.

Pericardĭum. *The membrane which ſurrounds the heart*; from περι around, and καρδια the heart.

PERICRANĬUM. *The membrane which covers the bones of the ſkull*; from ϖερι around, and κρανιον the cranium or head.

PERIOSTĔUM. *The membrane which ſurrounds the bones*; from ϖερι around, and οϛεον a bone.

PERISTALTIC *motion of the inteſtines*; from ϖεριϛελλω to contract.

PERITONĒUM. *The membrane lining the abdomen, and covering its viſcera*; from ϖεριτεινω to extend around.

PHALANX. *The bones of the fingers and toes* are called phalanxes, from their regular ſituation, like a φαλαγξ, or army of ſoldiers.

PHARYNX. *A membranous bag at the end of the mouth*; απο τȣ φερειν, becauſe it conveys the food into the ſtomach.

PHRENIC or *diaphragmatic nerve.* Φρενες the diaphragm; from φρην the mind, becauſe the ancients ſuppoſed it to be the ſeat of the mind.

PHYSIOLOGY. *That part of natural hiſtory which treats of the actions and functions of an animated body*; from φυσις nature, and λογος a diſcourſe.

PĬA MATĔR. *The innermoſt membrane of the brain*; ſo called becauſe it embraces the brain as a good mother folds her child.

PLACENTA. *The after birth*; from ϖλακȣς a cake, and from its reſemblance to a cake.

PLATȲSMA-MYOIDES. *A muſcle of the neck*; from ϖλατυς broad, μυς a muſcle, and ειδος reſemblance.

PLEURA. *The membrane lining the thorax*; ϖλευρα the ſide.

PLEXUS. *A kind of net-work of veſſels or nerves*; from *plecto* to weave together.

PRÆPUCE, or *foreſkin of the penis*; from *præputo* to cut off before, becauſe the eaſtern nations uſually cut it off.

Psoās. *A muſcle* ſo called; from ψοα the loin, being ſituated in the loins.

Pterygoid *proceſs.* From πτερυξ a pen or wing, and ειδος likeneſs; ſo called from its likeneſs to a pen or wing.

Pylōrus. *The lower orifice of the ſtomach, which opens into the inteſtines*; from πυλοω to guard an entrance, becauſe it guards as it were the entrance of the bowels.

R

Raphē. *A ſuture.* ʽΡαφη; from ῥαπτω to ſew.

Renēs. *The kidneys, απο τȣ ῥειν,* becauſe through them the urine flows.

Retĭna. *The net-like expanſion of the optic nerve, on the inner ſurface of the eye*; from *rete* a net.

Rhomboidēs. *A muſcle ſo called from its ſhape*; from ῥομβος a geometrical figure, whoſe ſides are equal but not right angled, and ειδος a likeneſs.

Rotŭla. *The knee-pan*; a dim. of *rota* a wheel, from its ſhape.

S

Sacrum. *A bone ſo called*; from *ſacer* ſacred, becauſe it was once offered in ſacrifices.

Salvatella. *A vein of the foot,* ſo called becauſe it was thought the opening it preſerved health, and cured melancholy; from *ſalvo* to preſerve.

Sanguis. *The blood*; *απο τȣ σωζειν γυια,* becauſe it preſerves the body.

Sartorĭus. *A muſcle ſo called, becauſe taylors croſs their legs with it*; from *ſartor* a taylor.

Scāpha. *The depreſſion of the outer ear before the anti-helix*; from σκαφη a little boat or ſkiff; from σκαπτω to dig, becauſe ſkiffs were formerly only trees made hollow.

SCAPHOIDĒS. *A bone of the carpus*, ſo called from its reſemblance to a ſkiff; from σκαφη a ſkiff, and ειδος a likeneſs.

SCLEROTIC. *A term applied to the outermoſt or hardeſt membrane of the eye*; from σκληροω to make hard.

SELLA TURCĬCA. Part of the ſphænoid is ſo called from its ſuppoſed reſemblance to a Turkiſh ſaddle.

SESAMOID *bones*. From σησαμη an Indian grain, and ειδος a likeneſs; from their reſemblance to the ſemen ſeſami.

SIGMOID. *Parts are ſo called from their reſemblance to the letter* Σ; from Σ, the letter Sigma, and ειδος likeneſs.

SPHÆNOID. From σφην a wedge, and ειδος likeneſs; ſhaped like a wedge.

SPHINCTER. *The name of ſeveral muſcles whoſe office it is to ſhut up the aperture around which they are placed*; from σφιγγω to ſhut up.

SPLANCHNOLOGY. *The doctrine of the viſcera*; from σπλαγχνον an entrail, and λογος a diſcourſe.

SYMPHȲSIS. *A connexion of bones*; from συμφυω to grow together.

SYNARTHRŌSIS. *A connexion of bones*; from συν with, and αρθρον a joint.

SYNCHONDRŌSIS. *A ſpecies of union of bones by means of cartilage*; from συν with, and χονδρος a cartilage.

SYNDESMOLOGY. *The doctrine of the ligaments*; from συνδεσμος a ligament, and λογος a diſcourſe.

SYNDESMŌSIS. *A ſpecies of union of bones by means of ligament*; from συνδεσμος a ligament.

SYNEURŌSIS. *A ſpecies of connexion of bones by means of membrane*; from συν with, and νευρον a nerve; becauſe membranes,

branes, ligaments, and tendons, were by the ancients conſidered as nerves.

SYSSARCŌSIS. *A ſpecies of connexion of bones by means of muſcle*; from συν with, and σαρξ fleſh.

SYSTŎLE. *The contractile motion of the heart and arteries*; from συστελλω to contract.

T

TENDON. From τεινω to extend.

THĒCA. The ſpinal canal is called *theca vertebralis*; from θηκη, from τιθημι to put.

THORAX. Θωραξ. *The breaſt* or *cheſt*; from θορεω to leap, becauſe in it the heart beats.

THYRO. Names compounded with this word belong to muſcles which are attached to the thyroid cartilage.

THYROID. From θυρεος a ſhield, and ειδος likeneſs; ſhaped like a ſhield.

TRACHEA. *The windpipe*, ſo called from its roughneſs; from τραχυς rough.

TRAPEZOID. From τραπεζιον a four-ſided figure, and ειδος likeneſs; reſembling a trapezium.

TROCHANTER. *A proceſs of the thigh bone*, ſo called from τρεχω to run, becauſe the muſcles inſerted in theſe parts perform the office of running.

TROCHLEA. *A kind of cartilaginous pulley*, through which the tendon of one of the muſcles of the eye paſſes; from τρεχω to run.

TROCHOIDES. *A ſpecies of articulation of bones*; from τροχος a wheel, and ειδος likeneſs; becauſe one bone moves round upon another, like a wheel upon axle-tree.

U

Ulna. *A name for the cubit*; from ωλενη the cubit.

Ureter. *The canal which conveys the urine from the kidney to the bladder*; from ουρον urine.

Urēthra. *The paſſage through which the urine paſſes from the bladder*; from ουρον the urine.

Uvea. *The poſterior lamina of the iris*, ſo called becauſe in beaſts (which the ancients chiefly diſſected) it is of the colour of unripe grapes; from *uva* an unripe grape.

Uvula. *The glandular ſubſtance which hangs down from the middle of the ſoft palate*; ſo called from its reſemblance to a grape. A dim. of *uva* a grape.

V

Valves. *Little membranes that prevent the return of the blood in the veins and arteries*; from *valvæ* folding doors.

Vertebræ. *The bones of the ſpine* are ſo called, from *verto* to turn.

Vomer. *A bone of the noſe*, ſo called from its reſemblance to a ploughſhare; from *vomo* to turn up.

X

Xiphoid. So called from the *reſemblance to a ſword*; from ξιφος a ſword, and ειδος likeneſs.

Z

Zygôma. *The cavity under the zygomatic proceſs of the temporal bone*; from ζυγος a yoke, becauſe it tranſmits the teadon of the temporal muſcle like unto a yoke.

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